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CHEMICAL AGE

VOL LIX 4 DECEMBER 1948 No 1534

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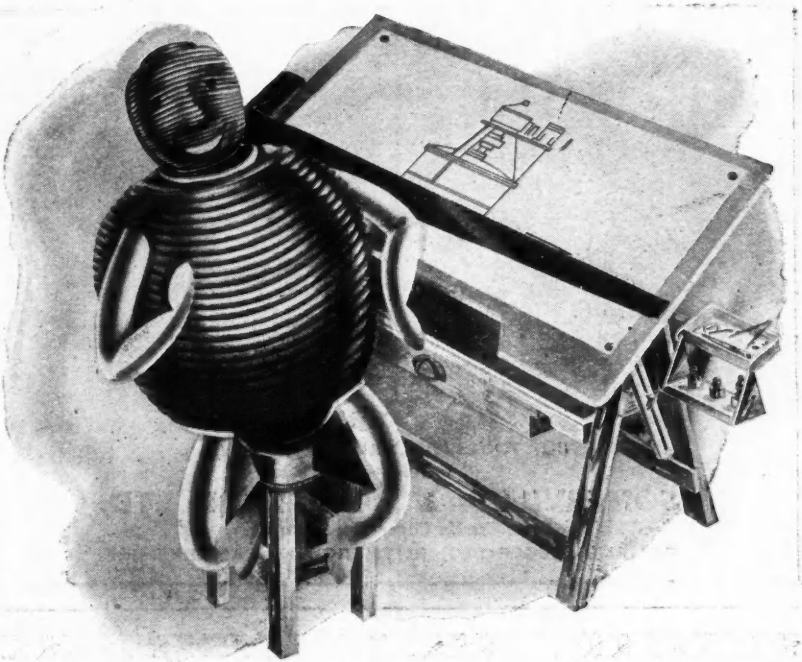

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Experience and Basic Principles

AT the British Association conference earlier this year, Sir Ewart Smith opened Section A (Physics) with a paper on "Instrumentation and Control." Sir Ewart's comments on the subjects directly indicated by his title are themselves of great importance to every chemist and chemical manufacturer, who is heavily dependent on the physicist for controlling his processes and testing his products. Yet when Sir Ewart came to discuss principles of training, his observations were even more noteworthy. "The universities and technical colleges should aim primarily at training men to understand basic principles, to be critical and to think for themselves," he said. It was more important "that the applied scientist should have the right approach than . . . a vast fund of detailed knowledge."

It would be well for the applied scientist to ask himself if he agrees with this, and in that case, if he applies the idea with its implications. Is it possible that British industry, over large sectors, is more interested in technologists with detailed training or experience than in applied scientists who "understand basic principles"? The demands of industry and the training courses of universities have a reciprocal and mutually-interacting relationship. Consequently, the views of industry cannot but have some influence on the schemes of training, and in turn on the character of the new recruits to the technical and scientific side of industry.

How then does industry fare? Judging by the "appointments vacant" advertisements, not very well. Emphasis on specialised knowledge or experience heavily outweighs that on mastery of basic principles. In comment, one might well adapt an old saying originally applied to engineering: In production, chemical technology makes developments, science makes revolutions.

For the solution of our present economic difficulties many things are needed. Among them, are not revolutions in production needed, and therefore science in the men in industry? The greatest asset and the export with least material demands on the economy is individual skill. While this comprises much of valuable tradition, must it not now more than ever comprise a larger part of originality and enterprise in approach, method and products?

Also at this year's British Association meeting, the president, Sir Henry Tizard, spoke caustically of manufacturers who "go on doing what they know they can do successfully, rather than to launch out in new directions." His strictures may be deserved only by a few, yet they seem to have the sting of truth in them. For it is certain that, apart from the question of completely new directions, there are many cases where *existing* knowledge is not applied, where perhaps heat transfer could be improved and frictional resistance to fluid flow reduced—to take some homely examples.

Might industry not gain by the use of the services of *in*experienced men, that is,

On Other Pages

of men inexperienced in a particular industry? The outstanding invention, radar, was developed by zoologists working together with radio men; efficiency of military operations was improved by physicists devising and applying the technique of operational research, working together with military men. Is there not a valuable pointer here?

These examples may be rejected as unrepresentative because the scientists concerned were front rank, first class brains, but the objection is not valid. Even the general run of mediocrity of trained scientists can perform some of this valuable cross-fertilising. Ordinary rank-and-file scientists, despite the defects of present-day educational methods, can surely pose useful questions arising from their basic training and perhaps knowledge gained in another industry.

Is not the way forward along the path of teamwork among experienced men and — possibly inexperienced — applied scientists? Surely for the sake of Britain's future, an overthrow of the cult of " experienced men only " and slavish adherence to precedent is needed. New standards seem to be imminent and new opportunities for the cultured, resourceful, all-round man, who is not averse to thinking along new lines and is capable of provoking similar thought in others.

Coal Tar Derivatives

Further Revised British Standards

THE following revised standard specifications have been issued by the British Standards Institution, undertaken at the request of the Standardisation of Tar Products Test Committee.

BSS 522 : 1948 for orthocresol, metacresol and paracresol. The main alteration compared with the last edition of 1938 is that two grades of material are classified according to crystallising point. The specification covers solubility in caustic soda, specific gravity, boiling point, crystallising point, and includes limits for residue on evaporation. (Price 2s. post paid.)

BSS 523 : 1948 for phenol. The principal change since the 1938 edition is that a method for the determination of water has been added to the appendices and the analytical methods have been generally revised. The specification covers solubility in water, crystallising point, boiling point, and includes limits for residue on evaporation and water. (Price 2s. post paid.)

BSS 524 : 1948 for refined cresylic acid. The main change compared with the last edition of 1938 is that a clause relating to residue on distillation has been added and the method of test defined. The specification provides for six grades of material: 99.8, 99, 98, 97 and 95 per cent, and covers specific gravity, colour and distillation range. Limits are specified for residue on distillation of water, pyridine bases and neutral oils, acids and alkalis and hydrogen sulphide. (Price 2s. 6d. post paid.)

NOTES AND COMMENTS

Political Rift

THE breach which has been widening continually between nearly all responsible sections of organised science in Great Britain and the U.S.S.R. has been conspicuously reflected since the war by a score of alarming deviations by spokesmen and delegates of Russian research departments from the terms of fellowship which for generations have linked workers in corresponding fields. The numerous laboured attempts to magnify the achievements of Soviet science and to belittle Western organisation, starting as a unique phenomenon, have become tediously familiar and have been consistently ignored by those best entitled to speak if any reply had been merited. Those manifestations of eccentric behaviour have been rightly dismissed as having no scientific interest—except possibly to a psychiatrist. The significant change which has been observable in the past few days seems to represent a reluctant but final recognition that what is at stake is not the popular reputation of this or that scientific school of thought but the freedom of science itself, which much grim accumulating evidence proves to have languished to such an extent wherever the Marxist philosophy holds sway that it must now be regarded as extinct.

Roll of Honour

THE rift now is finally confirmed by the public statements by the president and the past president of the Royal Society in which they have set out in unusually forceful terms their conclusions about the persecution which has been meted out to Soviet scientists whose work has failed to conform obsequiously with " the Party line " of the moment. The letter in which Sir Henry Dale, president from 1940 until 1945, has notified the president of the Academy of Sciences of his resignation of his honorary membership of the academy is at once an accusation and a memorial to distinguished Russians who have paid the penalty of failure to prostitute their intellectual achievements to the political whims of the dynasty. He mentions the cases of Nicholas Ivanovitch Vavilov, first director of the Lenin Academy of Genetics, whose election as one of the 50 foreign members of the Royal Society in 1942 now appears to have been a posthumous award, subsequent to his " removal " on political grounds, and Academician L. Orbeli, one of the few remaining representatives of the great Pavlov tradition, dismissed and inactive " because he failed to anticipate decrees in their restriction of all research and teachings in genetics in the U.S.S.R. to this politically imposed orthodoxy." Sir Henry Dale's re-creation of what has been happening calls to mind a roll of honour in which the names he mentions can scarcely have been the first and cannot be the last, so long as there remain in Soviet science departments any who seek to preserve the intellectual freedom which the Royal Society and its counterparts around the world have hitherto regarded as inviolable. (*Pages 746 and 747*)

Failure of Centralisation

THE need for further emergency tinkering and improvisation upon the cumbrous machine under which the coal industry labours has come before Parliament this week at a highly inconvenient moment for those who have just been insisting that the nationalisation of iron and steel and all their heterogeneous appendages should be hurried through with as little debate as possible. The first clause in the Coal Industry Bill, to which the second reading was given on Monday, gives authority to inflate the membership of the National Coal Board, without providing any evidence that the "new blood" will be any better qualified to bring realism and experience to the business of coal-getting and distribution and the handling of an uneasy labour force than is the present organisation. Now, after two years' of unfruitful experiment in centralised direction, the industry is yielding little more than is sufficient for essential home needs and the conclusion is unavoidable that the moment when our world-wide markets for coal could have been re-established with ease has already passed. In Belgium, for example, 2,431,000 tons of coal were raised in October last, that is to say as much as in any year before the war; in Poland, output is now reliably reported to be so ample that if that country were

minded to reduce export prices by even a small margin our prospects of resuming our international coal merchant rôle would be even more slender than they are now.

Opinion Invited

THIS is the season of settlements of accounts, and correspondingly a good moment for taking stock, of intangible things as well as goods and chattels. It is to this influence that THE CHEMICAL AGE owes the useful comments which a proportion of subscribers include with their orders for renewal of subscriptions, the invoices for which have lately been going out. From the editorial worker's standpoint these glimpses of readers' reactions to the commentary upon the rapidly changing conditions which this paper has sought to provide during the year are always welcome. While it is agreeable to be commended, it is even more stimulating to hear a reader's views of how the editorial formula might be strengthened by the addition or substitution of ingredients. Helpful comments on the other aspect of periodical publication, accountancy and kindred matters, is no less welcome. One subscriber in Akron, Ohio, U.S.A., writes this week " May I congratulate you on your businesslike action in submitting an invoice for a renewal well ahead of the time at which the old subscription expires?" Is that the view of the majority of subscribers? That is the kind of debatable topic about which the reader and subscriber is the only expert witness.

Water Wisdom

IT is customary to deplore the short-sightedness of the industrial pioneers, who conferred on this country a degree of prosperity it had never known before—and unthinkingly transformed fair waterways into noisome drains. The Irwell is one classic example. Something very similar is going on even now and, though its effects are not so conspicuous, it is infinitely more widespread. Industry, no longer highly localised, is continually putting into use new techniques, a good many of which give rise to waste products less noisome than some of the more familiar sources of pollution, but a great deal more toxic and persistent. This represents one of the more obstinate problems with which the Water Pollution Research Laboratory (DSIR) at Watford, Herts., is dealing, and its importance is reflected in the brief survey of recent work and projects in hand which the laboratory has just issued. This publication bears only the laboratory's name, without the distinction of a subject title, the inclusion of which would have made very much easier its classification in the growing bibliography. Perhaps the fact that it deals briefly and in general terms with almost the entire field of domestic and industrial water pollution and its prevention defeated attempts to give it a specific title. It should, however, achieve its purpose of focusing attention upon the gravity of the problem raised by the fact that water is being used industrially on an ever increasing scale and a great deal of it is being rendered unfit for any further use. Much of the work of the laboratory accordingly is wisely directed to finding ways of enabling industrial effluents to be used more than once, not merely of being rendered fit to discharge into the sewer. Here is a most promising field for the chemist. Saving in water charges is one immediate incentive and, beyond that, the prodigal use of natural supplies and the recurrence of drought conditions make all reasonable economies an obligation.

The British Association

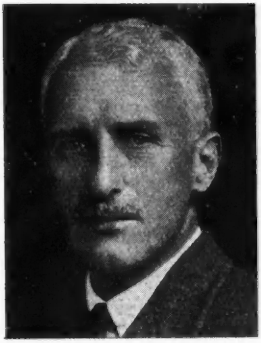
Next Year's Conference

THE annual meeting of the British Association for the Advancement of Science has been arranged to take place at Newcastle-on-Tyne from August 31 to September 7, 1949. It is expected to be one of the largest gatherings in the association's history.

Appointments to the various offices include the following: President, Sir John Russell; general treasurer, Mr. M. G Bennett; general secretaries, Dr. Edward Hindle, and Sir Richard Southwell. Presidents of sections: Sir Harold Spencer Jones (physics and mathematics); Prof. Sir Alfred Egerton (chemistry); Prof. W. J. Pugh (geology); Prof. A. C. Hardy (zoology); Prof. R. A. Peters (physiology); Prof. N. M. Comber (agriculture). Chairman of the local executive committee, Lord Eustace Percy.

A NATIONAL SCIENCE CENTRE?

Sir R. Robinson's Anniversary Address to the Royal Society



The president (left) and Prof. A. V. Hill, of whom the former says: "He seems to range over all physical science and has even invaded the province of organic chemistry." His great services to physiology arose from his curiosity and ambition to attack some of the most difficult problems in the spheres of biophysics and biochemistry

AMPLIFYING his most comprehensive review of individual and general achievements in many departments of science during the year, the president of the Royal Society, Sir Robert Robinson, in his anniversary address to the society on Tuesday, revealed a number of important changes in the affairs of the society at home and in the relations between British scientists and those who are now in control of scientific affairs in the U.S.S.R.

This, the 286th anniversary meeting, also heard the terms of the greetings which the society sent to T.R.H. the King and Princess Elizabeth on the birth of the Prince, to which the following replies were received:—

"Please convey to the Council and Fellows of the Royal Society the sincere thanks of the Queen and myself for their kind message on the birth of our grandchild. George R."

"We are most grateful for your kind message of congratulations. Elizabeth and Philip."

Seven Awards

The president then announced the award by the society of the following honours and gave a critical appreciation of the contribution to knowledge which each of the recipients had made:—

To Prof. Archibald Vivian Hill, C.H., the Copley medal for his outstanding contributions to the physiology of muscular processes.

To Prof. Franz Eugen Simon, C.B.E., the Rumford medal for his distinguished researches on the properties of matter at low temperatures.

To Prof. Harold Jeffreys, a Royal medal for his fundamental investigations in theoretical geomechanics.

To Prof. James Gray, C.B.E., a Royal medal for his distinguished work on the mechanisation of posture and locomotion in vertebrate and other animals.

To Prof. Edmund Langley Hirst the Davy medal for his distinguished contributions to the chemistry of the carbohydrates.

To Prof. Ronald Aylmer Fisher the Darwin medal for his distinguished contributions to the study of biological evolution.

To Sir Robert Watson-Watt, C.B., the Hughes medal for his pioneer researches in radio-telegraphy.

To Leave Burlington House?

In the course of his review the president said:—

A year ago I mentioned the formation of a committee to study the means whereby adequate accommodation for the scientific societies may be made available. Without being too indiscreet it is possible to provide some further information on a subject of great interest to the Fellows of the society.

In the first place the Scientific Accommodation Committee has so far considered only the long-term problem and it is matter for congratulation that representatives of so many interested parties reached full agreement on this aspect. It was unanimously agreed that the institution of a science centre would provide the best solution. We hope that it will soon be possible to announce a definite outcome, such that a suitable site will be allocated for the eventual creation of a worthy science centre. We have the assurance that favourable con-

sideration will be given by Ministers to transference to a better site, should such be found.

The course of discussion showed that the co-operation of several scientific societies depended on that of the Royal Society and your representatives accepted the flattering implications, though not without some hesitation. To speak directly that means willingness, if necessary in the general interest, to leave Burlington House and to function as the heart of the Science Centre located elsewhere.

The Report of Council mentions the reconstitution of a "Rutherford Memorial Committee" which has various schemes under consideration. At the last meeting of this committee I ventured to suggest that, as one aspect of the memorial, a "Rutherford Hall" of noble design, should form a part of the Science Centre and this was given general approval by the committee and later by Council.

State and the Scientist

I refer to the report that eminent Russian biologists have been constrained to subscribe to interpretations of the data in the field of genetics which they had previously rejected, or perhaps had thought unworthy of serious consideration. According to *Pravda* "The Academy of Science forgot that the most important Principle in Science is the Party Principle." That is a forthright declaration which leaves little scope for ambiguity. The incident is evidently of political rather than of scientific importance, and the Royal Society is not concerned with politics.

We regret that the Academy of Sciences of Moscow has broken off its long correspondence with us. We trust that the new conditions will not seriously impede the advance of biological science for which such qualification as "Western" are as irrelevant as they would be for a multiplication table. We impute no blame and express no opinion as a body, but that does not mean that we must take no cognisance of the occurrence which may have some lessons for us, at least by way of analogy.

For example, we may observe that Governments are not infallible, yet must be obeyed. This reflection should make us more than ever alert to preserve intact the prized freedom of science in our own domain. Actually no direct attack is likely here, and should the unexpected happen it will certainly not be along the lines of compelling us to espouse some particular scientific theory or doctrine. Conceivably it could take the more subtle form of control of the character and direction of our scientific work.

There is immediate danger in the current deprecation of fundamental research, not of course absolutely, but relatively, in comparison with technological applications. I hope it will be the opinion of all Fellows that the Royal Society should take a leading part in upholding our ideals and in clarifying ideas on these topics and particularly in insisting on the vital rôle which the highest kind of disinterested investigation must play in the life of the community.

It is certainly not sufficiently realised that the body scientific can only flourish when all its organs are in a healthy condition. As in a biological equilibrium there is a natural interdependence between pure and applied research. Pure science is fertilised by the advance of technology and *vice versa*. It would be quite consistent, though lamentable, to take up the position that we will have no more research at all and devote our energies to the exploitation of present knowledge. But is it impossible to dissect the elements of real progress. If we isolate one of the limbs of the organism it will not grow and will soon die.

Government Support

Mr. Herbert Morrison, Lord President of the Council, at the dinner of the Royal Society in London on Tuesday night, proposing the toast of "The Royal Society," said that never had more depended on the capacity and tenacity of scientists to maintain their traditions without compromise. The struggle in which we were engaged to-day for the whole future of western civilization was a struggle to defend a few simple fundamental values without which free men could not live. The spirit of scientific inquiry, the scientific approach to problems of all sorts and the self-discipline and universality of the scientist were among the most essential of those values.

The Government was very sympathetic to the creation of a Science Centre in London which would become a worthy home for what had come to be regarded as the British National Academy of Sciences. "I can make no promises," he said, "but I hope that before long the Government will be able to acquire on your behalf a site on which a science centre can be built."

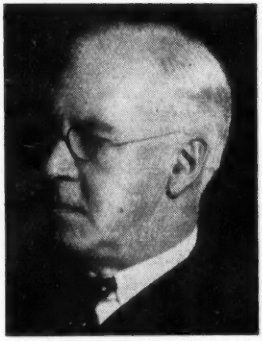
Early Professor of Chemistry.—Professor William Davidson, first known professor of chemistry in Europe who graduated in 1617, was remembered by Aberdeen on November 26, when Professor Read, of St. Andrew's University, lectured. Davidson worked in Paris as an apothecary, taught chemistry and later became physician to the King of France. He later acted in this capacity to the King of Poland and wrote the first of his important books.

Persecution of Russian Scientists

Sir Henry Dale Resigns from Soviet Academy of Sciences

SIR HENRY DALE, president of the Royal Society 1940-1945, has resigned his honorary membership of the Academy of Sciences of the U.S.S.R.

In a letter to the president of the



Sir Henry Dale

Academy, Sir Henry, who had publicly declared his views of the U.S.S.R. assault on the freedom of science at a meeting of the Atomic Scientists' Association (THE CHEMICAL AGE, November 6), quotes the few facts known relating to the mystery of the distinguished Russian scientist N. I. Vavilov.

Declaring that he fears the president of the U.S.S.R. Academy of Sciences and his colleagues must be acting under coercion, Sir Henry offers them his sympathy and concludes his letter: "For my own part, being free to choose, I believe that I should do disservice even to my scientific colleagues in the U.S.S.R. if I were to retain an association in which I might appear to condone the actions by which your academy, under whatever compulsion, is now responsible for such a terrible injury to the freedom and the integrity of science."

Defence Freedom

In his summary of what is known about the fate of the first director of the Lenin Academy of Genetics Sir Henry Dale recalls: "It had been reported in Britain already in 1942, that N. I. Vavilov had somehow fallen from favour with those who came after Lenin, though the cause of his trouble was still unknown; we might have supposed it to be political or otherwise irrelevant to his scientific achievement. Not till 1945 did the Royal Society discover that he had been dismissed from his position, had disappeared with a number of his co-workers in genetics, and had died at some unknown date between 1941 and 1943.

"Repeated inquiries addressed to your academy by the Royal Society through all available channels asking only the date and the place of his death received no reply of any kind. I understand that the Royal Society has not yet been officially informed whether this distinguished Russian scientist was still alive at the time of his election to its foreign membership.

"More recent events, of which full reports have come to hand, have made it clear what has happened. The late N. I. Vavilov has been replaced by T. D. Lysenko, the advocate of a doctrine of evolution which, in effect, denies all the progress made by research in that field since Lamarck's speculations appeared early in the nineteenth century . . . . This is not the result of an honest and open conflict of scientific opinions; Lysenko's own claims and statements make it clear that his dogma has been established and enforced by the Central Committee of the Communist Party as conforming to the political philosophy of Marx and Lenin."

To Share Technology

Montecatini and American Cyanamid

AN agreement to co-operate by exchanging information and some patent rights relating to dyestuffs, pigments, and a few textile and rubber chemicals, has recently been concluded between the American Cyanamid Company and the Italian Montecatini chemical and mineral combine, which has 103 plants throughout the world. Under the terms of the agreement, full details of which have not yet been made available, each of the parties is free to sell products covered by its patents in any country of the world. No exchange of information about fertilisers and insecticides is proposed.

Confirming reports of the conclusion of the contract, American Cyanamid officials in New York said: "It is expected that information made available under this agreement will be of substantial benefit in the rehabilitation of the Italian chemical industry and give to the United States industry knowledge of the latest technical advances in Italy on the subjects covered by the agreement." The agreement is not confined to past achievements alone, but covers exchange of information on any new developments by either of the parties.

New Lead Combine

Eight Firms Involved

EIGHT companies prominently associated with the lead industry will, from January 1, 1949, no longer use their individual names, but will trade under the single name of Associated Lead Manufacturers, Ltd. They are :—

Cookson Lead & Antimony Co., Ltd.; Locke, Lancaster and W. W. & R. Johnson & Sons, Ltd.; Walkers, Parker & Co., Ltd.; Foster, Blackett & James, Ltd. (lead departments only); the Librex Lead Co., Ltd.; the London Lead Oxide Co., Ltd.; A. T. Becks & Co., Ltd.; the Oidas Metals Co., Ltd.

The A.L.M. was nominally incorporated in 1919, and co-operation between the individual firms is stated to have grown steadily closer since then. The present stage was delayed only by the war. The change will, it is intended, help to streamline the organisation and is part of a general process of reorganisation which is aimed at giving customers the advantages of nationally organised purchasing and distribution and of co-ordinated modernisation of plant, processes and research.

Some of the companies concerned date back to the 18th century; Cookson's were formed in 1704, and the Thames-side works of Locke, Lancaster's opposite Greenwich Hospital have for very many years been well known to all users of the river. Another memento of the long establishment of one of the associated firms is the familiar shot tower on the south bank of the Thames built by Walkers, Parker & Co. in 1830. It is understood that this is the only building which will be preserved on the site of the 1951 Exhibition. A later incident is the industry's contribution to the famous Pluto installation.

Under the new organisation there are three main area offices at London, Newcastle and Chester, the head office also being in London. There are ten factories for the manufacture of lead and lead products, together with antimony and tin and their products and many special alloys. The factories cover an area of 56 acres.

Leaded Zinc Oxide

THE British Standards Institution announces the issuing of a new British Standard (1481 : 1948) setting up approved characteristics of leaded zinc oxide.

This specifies that the leaded zinc oxide shall be in the form of a dry, soft powder, consisting of either co-fumed or blended zinc oxide and basic sulphate of lead. It shall be one of three types, except by special agreement, the compositions of which are set out in tabular form.

Industrial Alcohol Freed

BoT Notes Improvement in Supplies

THE Board of Trade announces that an order has been made releasing the following commodities from control from January 1, 1949 : methylated spirit, acetone, butyl acetate, ethyl acetate, amyl alcohol, fusel oil and paraformaldehyde.

This order gives formal effect to the decontrolling of one of the groups of commodities which the President of the Board of Trade announced on November 4 were to take place during November and December. The commodities named, with the exception of amyl alcohol and paraformaldehyde have been under statutory control of acquisition, disposal, use and price since September 1939. Amyl alcohol was brought under control (but not of price) in July 1940 and paraformaldehyde similarly in Febraury 1942. The shortage of supplies which has persisted throughout has now eased, says a BoT statement accompanying the news.

S.I. 1948 No. 2572, The Molasses and Industrial Alcohol (Amendment) (No.2) Order, 1948 (1d.), which relates to the new conditions, is now available from H.M. Stationery Office.

Conveyance of CS_2

New regulations governing the conveyance of carbon bisulphide, which came into operation on November 8, state that " the tank, if of more than 600 gallons capacity, shall be divided into self-contained compartments, no one of which shall contain more than 600 gallons." This relates to the construction of mechanically driven road tank wagons, and is in substitution for a similarly worded paragraph in the regulations of 1935 which provided for 500 gall. in each instance.

Duty Exemption Orders.—Gas mantle ash has been exempted from customs duties by the Treasury under the Safeguarding of Industries (Exemption) (No. 9) Order, 1948, and the Import Duties (Exemptions) (No. 5) Order, 1948. Under the former order, tricyan-triamide is also exempted from Key Industry Duty for a period ending December 31, 1948. The orders came into operation on November 18.

Gelatine and Glue Restrictions Eased.—Restrictions on the acquisition, supply, and use of animal glue, gelatine, and size have been withdrawn. These restrictions were imposed by the Board of Trade under the Glue, Gelatine and Size (No. 3) Order, 1946. Ministry of Food restrictions on certain uses of edible gelatine are withdrawn at the same time. Import and export licences for animal glue, gelatine, and size, and for edible gelatine, are still required.

DEPRECIATION AND MAINTENANCE–IV

Repairs, Renewals and Overhauls of Chemical Plant

by S. HOWARD WITHEY, F.Comm.A.

THE annual cost of maintaining units and sections of chemical plant in proper working condition varies considerably, not only as between one period and another but in individual cases according to the nature of the operations to be performed. Much of the equipment at present in use is of a high standard, but some work has to be carried through at such speed that the burden of repairs, renewals, overhauls and adjustments is increasing at a very rapid rate and special efforts are called for to ensure the building up of reserves adequate to meet all contingencies.

Invoices and debiting documents relating to a particular operation or contract may have been properly entered and classified in the user's purchases journal or bought day-book, but unless provision is made for all outstanding charges the figures shown in the final accounts may be very misleading. Proportions of expenses outstanding at the date of stocktaking or balancing should be passed through the books by inserting the amounts as the last entries on the debit side of the respective ledger accounts, with the date and the words "To Reserve," enabling the full and proper charge under each heading to be incorporated in production costs.

Such reserves should be treated as liabilities when drafting the balance sheet and should be shown in the expenses ledger as the opening items on the credit side of the particular nominal accounts to commence the next operating period, with the date and the words "By Reserve," in each case.

Three Years' Average

If the cost of upkeep and maintenance of plant does not exceed the average for the previous three or four years, a reserve may be created to enable the burden to be met without undue strain, and this applies even though the actual maintenance or repair work is not likely to be put in hand for some time. In addition to such provisions, it is often advisable to set aside some portion of the disposable profit to help tide over the many difficulties likely to be encountered before targets are reached, such reserves being made after the book value of the plant has been written down in accordance with a definite scale and after provision has been made to cover all anticipated losses and liabilities.

Sums allocated out of profits for strengthening the general financial position of the business, or to enable dividend to be paid or maintained, should be regarded as capitalised profits on the principle that profits which have actually been realised are turned into working capital. There can be no such reserve if the profit and loss account already shows a debit balance—all financial losses must first be wiped out—but some firms possess reserves which are not disclosed on the balance sheet.

Book Value

For example, the value of property has increased during recent years and the book value of the works premises may be considerably lower than the actual value as between a willing buyer and a willing seller, or stocks may have been deflated, or excessive amounts written off during previous periods, so that there is a material difference between a reserve and a reserve fund not always appreciated by directors and executives.

A reserve should be regarded as a proper charge against production operations, and, therefore, against profits, but a reserve fund consists entirely of sums which have been set aside out of profits for the purpose of meeting certain contingencies, the vital distinction being that even though the result may be a financial loss for the period under review it is essential that all reserves should be brought into the account, whereas it is impossible to build up an effective reserve fund except by means of appropriations from profits which have been made. In other words, a reserve fund really constitutes an earmarked portion of the periodical profit-and-loss account.

In some cases provision for contract prices which are likely to prove irrecoverable is made by calculating a certain percentage of the total sum outstanding at the balancing date, but it is better to examine the items individually and to make out a list of all amounts which are either definitely irrecoverable or very doubtful of collection. Such reserves should be shown as deductions from the assets when drafting the balance sheet, and the same applies to provisions made to cover discounts or rebates allowable in respect of settlements with recognised or stipulated periods.

In order to ensure that funds will be available for the acquisition and installation of the most modern units and sections

of chemical plant without inconveniently depleting the amount of available working capital, a sinking fund may be created, and the procedure and principles involved can perhaps best be demonstrated by referring to an actual case.

At the end of December last, the plant employed by a firm of chemicals manufacturers in the Midlands had a balance-sheet value of £30,000 and it was decided to take up an outside investment for the specific purpose of securing the sum of £30,000 in ten years' time for re-equipment. The sum needed each year to produce the required amount was ascertained by referring to a table, of which the following is an extract. This gives the decimal part of £1 required to produce £1 at the end of periods ranging from three to 15 years *after* allowing for compound interest at varying rates.

The rate of interest on the investment was 5 per cent and arrangements were made to pay ten annual premiums, the amount payable each year being ascertained by multiplying the decimal .079505 by 30,000, giving £2385. This figure will be debited to each year's profit-and-loss account and will replace the ordinary debit for depreciation, the plant account remaining unaltered during the period, and a corresponding credit entry will be made each year on the credit side of a sinking fund account to which will be added the annual interest items as shown on the debit side of the investment account. At the end of the period of ten years the investment account will contain the following entries :—

Sinking Fund Table

Years	3 Per cent.	3½ Per cent.	4 Per cent.	4½ Per cent.	5 Per cent.
3 ...	.323530	.321934	.320349	.318773	.317209
4 ...	.239027	.237251	.235490	.233744	.232012
5 ...	.188355	.186481	.184627	.182792	.180975
6 ...	.154598	.152668	.150762	.148878	.147017
7 ...	.130506	.128544	.126610	.124701	.122820
8 ...	.112456	.110477	.108528	.106609	.104722
9 ...	.098434	.096446	.094493	.092575	.090690
10 ...	.087231	.085241	.083291	.081379	.079505
11 ...	.078077	.076092	.074149	.072248	.070389
12 ...	.070462	.068484	.066522	.064666	.062825
13 ...	.064030	.062062	.060144	.058275	.056456
14 ...	.058526	.056571	.054669	.052820	.051024
15 ...	.053767	.051825	.049941	.048114	.046341

Investment for Plant Replacement

DEBIT			CREDIT		
1948		£	1948		£
Jan.	To Premium	2,385	Dec.	By Balance carried down	2,505
Dec.	,, 5 per cent Interest	120			
		£2,505			£2,505
1949			1949		
Jan.	,, Balance brought down	2,505	Dec.	,, Balance carried down	5,133
Jan.	,, Premium	2,385			
Dec.	,, 5 per cent Interest	243			
		£5,133			£5,133
1950			1950		
Jan.	,, Balance brought down	5,133	Dec.	,, Balance carried down	7,893
Jan.	,, Premium	2,385			
Dec.	,, 5 per cent Interest	375			
		£7,893			£7,893
1951			1951		
Jan.	,, Balance brought down	7,893	Dec.	,, Balance carried down	10,791
Jan.	,, Premium	2,385			
Dec.	,, 5 per cent Interest	513			
		£10,791			£10,791
1952			1952		
Jan.	,, Balance brought down	10,791	Dec.	,, Balance carried down	13,836
Jan.	,, Premium	2,385			
Dec.	,, 5 per cent Interest	660			
		£13,836			£13,836
1953			1953		
Jan.	,, Balance brought down	13,836	Dec.	,, Balance carried down	17,031
Jan.	,, Premium	2,385			
Dec.	,, 5 per cent Interest	810			
		£17,031			£17,031
1954			1954		
Jan.	,, Balance brought down	17,031	Dec.	,, Balance carried down	20,388
Jan.	,, Premium	2,385			
Dec.	,, 5 per cent Interest	972			
		£20,388			£20,388

			£
1955			
Jan.	„ Balance brought down		20,388
Jan.	„ Premium		2,385
Dec.	„ 5 per cent Interest		1,140
			£23,913
1956			
Jan.	„ Balance brought down		23,913
Jan.	„ Premium		2,385
Dec.	„ 5 per cent Interest		1,317
			£27,615
1957			
Jan.	„ Balance brought down		27,615
Jan.	„ Premium		2,385
			£30,000

			£
1955			
Dec.	„ Balance carried down		23,913
			£23,913
1956			
Dec.	„ Balance carried down		27,615
			£27,615

The annual payments will be posted direct to the account from the credit side of the firm's cash book, and will aggregate £23,850, the balance of £6150 representing interest, made up as follows:—

	£
1948	120
1949	243
1950	375
1951	513
1952	660
1953	810
1954	972
1955	1,140
1956	1,317
Interest	£6,150

Upon realisation of the investment the sum of £30,000 will be entered on the debit side of the cash book and posted direct to the credit side of the investment account, which will then be ruled off. The balance of the sinking fund will be transferred to the credit of the plant account, and the invoiced cost price of the new plant will be capitalised in the usual way. At the close of each of the ten years the balance standing to the credit of the sinking fund will appear on the liabilities side of the balance sheet, and the debit balance of the investment account will appear as an asset.

The difference between depreciation and a sinking fund account is brought out when money is borrowed for the purpose of installing additional plant or for extending the business premises. The money may be raised on mortgage debentures and may be repayable in equal instalments over a number of years, and it would be incorrect to charge only this fixed sum in the accounts.

When output is expanding, the credit side of the periodical trading account will also expand, and it is only fair and proper to debit a correspondingly larger sum against the operations. The liability to debenture holders does not necessarily bear any relation to the year's trading, but when properly computed and suitably adjusted the calculation of depreciation can usually be made to represent an equitable charge against revenue.

In the case of gas undertakings and where the shareholders are entitled to larger maximum dividends *pro rata* as the price of gas is reduced below the standard, reserve funds accounts are built up out of disposable profits for the equalisation of dividends, and only expenditure which has been incurred in equipping the works is capitalised, the cost of repairs and renewals being charged against revenue, although in a few cases when a works is reconstructed a proportion of the cost is capitalised.

If the plant and other assets of a business amount to, say, £50,000 and the various liabilities aggregate £30,000, and it is decided to transfer £10,000 to a reserve fund, the amount standing to the credit of the profit and loss account would be reduced from £20,000 to £10,000 it would be necessary to transfer £2000 from the reserve fund to eliminate the deficiency, thus:—

BALANCE SHEET (BEFORE TRANSFER TO RESERVE FUND)

LIABILITIES	£	ASSETS	£
Sundry Liabilities (enumerated)	30,000	Sundry Assets (enumerated)	50,000
Profit and Loss	20,000		
	£50,000		£50,000

BALANCE SHEET (AFTER TRANSFER TO RESERVE FUND)

	£		£
Sundry Liabilities	30,000	Sundry Assets	50,000
Reserve Fund	10,000		
Profit and Loss	10,000		
	£50,000		£50,000

(*Continued at foot of following page*)

Substantial Recovery in France

Production Stimulated by German Chemical Equipment

REVIEWING the use to which France has put her reparations, the French Embassy Information Division in New York reports that equipment delivered as reparations has already contributed substantially to the nation's recovery. Its value as at February 15, 1948, compared with that of French imports of industrial equipment, was as follows in three key industries: Electrical industry, 9 per cent; machine-building industry, 22 per cent; chemical industry, 167 per cent.

If the reparations machinery had not existed, France would, in all probability, have been unable to obtain this essential industrial equipment in Europe; she would have had to purchase it in countries outside Europe and, in consequence, the deficit on her balance of payments and on that of Europe would be proportionally greater.

The material destruction suffered by France during the war and occupation has been valued at 28 billion dollars. Her entire stocks of raw materials were seized by the Germans and she lost 80 per cent of her industrial equipment, so that, at the liberation, she was faced with problems demanding an immediate solution.

In French chemical industry, the reparations furnish not only power installations, but also workshops and production equipment such as vats, pipes and gate-valves, which were very scarce after the war. By December 1, 1947, with transfers of equipment from factories at Hess Lichtenau and Ebenhauser, "Francolor," the officially sponsored chemical and dyestuff group, was able to double the output of tyre vulcanisers in the factory at Villers Saint-Paul in the Oise Department and to increase the production of azo dyes by 15 tons per day in its factory at Saint-Oissen (Saine-Inferieure).

The synthetic fibre, dyestuff, resin and plastics industries in the Lyons region urgently require supplies of sulphuric acid. Assuming that France possessed the necessary materials, it would take more than two years to build a workshop like that of the Allendorf works which was allocated to the Société Saint-Gobain for its plant at Saint-Fons in the Rhône Department. This workshop, which uses the contact process, will resume production at the end of 1948 and will supply 36,000 tons of concentrated sulphuric acid a year, a quantity equivalent to approximately 10 per cent of France's present production which fluctuates between 300,000 and 350,000 tons.

At the end of the current year, the vanadic acid works of the Norddeutsche Hutte plant allocated to the Société Electro-Metallurgique d'Ugine for its Plombieres Saint-Marcel works in the Alps, will go into production. This will increase output by 15 tons of pure vanadium a year, thus enabling France to satisfy her requirements of ferro-canadium for special steels.

PROFIT AND LOSS ACCOUNT

DEBIT	£	CREDIT	£
To Transfer to Reserve Fund	10,000	By Balance	20,000
,, Balance	10,000		
	£20,000		£20,000
,, Loss	12,000	,, Balance	10,000
		,, Transfer from Reserve Fund	2,000
	£12,000		£12,000

RESERVE FUND

DEBIT	£		£
To Transfer to Profit and Loss Account ...	2,000	By Transfer from Profit and Loss Account ...	10,000
,, Balance carried down	8,000		
	£10,000		£10,000

Although amounts expended in the maintenance of plant are as much a charge against profits as are wages paid to employees, such expenditure often has the effect of increasing the number or value of the productive assets, in which case it should be capitalised and a proportion or percentage written off each year for depreciation due to wear and tear, corrosion, obsolescence, etc.

(To be continued. Parts I, II and III of this article appeared on August 21, October 2 and November 13).

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RESEARCH ON GAS MIXTURES

Some Substitutes in Continental Steel Making

ALTHOUGH the installation of gas producers for the firing of open-hearth steel furnaces shows no signs of being restricted at the moment, the desire to economise in fuel has aroused greater attention in alternative means of utilising coke-oven and blast-furnace gases.

These have long received close attention by Continental steel makers, with a view to rendering the costly and complicated producer outfit unnecessary, but their practicability depends on the fairly close proximity of blast furnaces and coke ovens—which is not always so common in this country.

The extended temperature of the Martin steel hearth is expected to be not much below 2100°C. and blast-furnace, and even coke-producer gas cannot attain this degree alone. When the blast is heated to 1000°C. with the familiar excess to ensure complete combustion, the theoretical combustion temperature of blast-furnace gas is 1850°C. and coke-producer gas 2000°C. Coal-producer gas, however, attains 2100°C. and coke-oven gas 2300°C. This is in conditions where each fuel gas, except the latter, has been initially heated.

Three tons of coal require to be carbonised to provide enough gas to make one ton of steel, where the coke ovens are heated by their own gas; by heating the ovens with blast-furnace gas, this difficulty may be largely overcome.

Plus Water Vapour

The mixing of the various gases has led to complications in practice, as there appeared to be some dissociation effects; steam injections were accordingly tried out. As a prohibitive quantity of steam was found necessary to be fully effective, gases containing fixed quantities of water vapour were substituted. One mixure successfully used comprised 80 per cent coke-producer gas, and 20 per cent coke-oven gas containing 0.11 oz. of water vapour per cu. ft.

Earlier large-scale experiments with blast-furnace gas enriched with coke-oven gas showed that appreciable losses were suffered due to pre-heating, and that at 932°C. decomposition took place, with some reduction in hydrogen and methane contents. It was found necessary to adjust the heat values, and vary the proportion of the one gas to the other during the run. The ratio of blast-furnace gas predominated at the beginning, while coke-oven gas was increased towards the end of the melt. For all-round conditions, a mixture capable of giving a calorific value of 7.142 to 7.936 B.Th.U. was considered most satisfactory.

For the making of special alloy steels in the tilting open-hearth furnace, a jet of patented design for mixing the gases was first introduced by A. Schneider. The gas mixture supplied was claimed to give a practically neutral atmosphere over the bath, while a highly basic slag was produced, which, without reducing the carbon content, absorbed all the phosphorus and sulphur.

Direct Use of Coke-Oven Gas

Following this experience, as the matter of calorific value was considered of prime importance, coke-oven gas which had not been treated for the removal of the benzols, etc., was thought to be ideal alone since as much as from 16.952 to 17.856 B.Th.U. could be obtained. At first it was considered that coke-oven gas required a long hearth to ensure best results, but success was achieved later using the cold gas with different furnace designs.

At the foregoing calorific value, using a 30-ton furnace, the gas consumption worked out at approximately 10.595 cu. ft. per ton of steel produced. The normal removal of benzols, however, reduced the value to 15.872 B.Th.U. when the gas was at its best, and unduly lengthened the time of the heat.

Despite this, the work was extended to 100-ton furnaces, where the gas was led through pipes of 27.5 in. diameter, and then injected into the furnace through water-cooled burners made of wrought iron, and where the pressure was kept at from 10 to 12 in. of water by regulator valves.

A circumstance which is of importance in the manufacture of high-grade steel, is that as coke-oven gas is dry and low in sulphur content, its high proportion of hydrogen can

(*Continued overleaf*)

create a reducing atmosphere over the bath. The circumstance that the gas burns with an almost invisible flame, and allows a clear view of the contents at all times, holds undeniable advantages, but is not without pitfalls.

This was made very apparent in the initial runs, when the furnace attendants supplied too much gas with disastrous results to the refractories. Other advantages were that the manganese consumed was less than where generator gas was used, and the water-cooled burners enjoyed a long life, and could be readily replaced.

Gas Mixtures

This work with cold coke-oven gas differed in a number of respects from normal operations, and more stringent provisions had to be made to prevent explosions. Despite the advantages, mixtures with blast-furnace gas were again brought into use.

As an alternative to these methods, under the stress of fuel scarcities, a further improvisation was made on the Continent—the substitution of a mixture of blast-furnace gas with gas from brown coal briquettes.

Unlike the earlier experience, the durability of the furnace was not endangered, and in one instance the roof was found to be in good condition after 412 heats.

No falling-off in production, as compared with the use of pure briquette gas, was encountered; this was accounted for by the fact that the tar from the gas producer played an important part. A large proportion of blast-furnace gas could be employed, because of the enrichment provided by this tar vapour.

It was found necessary to operate the producer slowly and at low temperatures, so as to ensure the maximum development of this tar vapour. For example, in a revolving grate producer of 9½ ft. diameter, only from 7 to 10 charges were worked per 24 hours. The producer had to be worked more slowly as the proportion of blast-furnace gas passed into the open-hearth was increased.

The data which has been published on these subjects make manifest the anxious study of alternatives to which prolonged fuel shortages in some Continental countries gave rise. By such substitutions it has been possible to maintain steel production during periods of great difficulty.

First Continuous Hot Rolling Mill in France

IN order to assist in stepping up economic recovery in France—which is closely allied to the problem of increasing French production of steel plate (now only 75 per cent of the pre-war figure)—it is expected that before the end of 1949 the first continuous hot rolling mill will be in operation in the Denain works at Anzin (Nord).

Using U.S. Equipment

France at present possesses only one continuous rolling mill, a cold one, set up by the Renault Company in 1920 at Hagondange, in Lorraine. A few months ago, two great iron and steel companies, the Société des Forges et Acieries du Nord et de l'Est and the Société des Acieries de Denain-Anzin, while retaining their autonomy in such activities as the exploitation of iron mines, merged their resources in order to utilise two continuous rolling mills, one hot and the other cold, for the production of steel plate. This equipment was purchased in the United States and part of it has already been delivered at Dunkirk.

The continuous hot strip mill will produce 150 tons of steel plate per hour The second, a continuous cold rolling mill, with an annual capacity of 250,000 tons, will be set up at the Montataire works (Oise), where it will re-roll the blanks produced at Denain, reducing them from a thickness of 4 mm. to a few tenths of a mm. The total equipment for the hot strip mill, amounting to 35,000 tons, will require several more shipments.

It is unlikely that these giant installations will be in use before the end of 1949, because of the need to set up the milling cutters and build adequate furnaces. Once they go into production, however, they will account for a quantity of steel plate equivalent to total output in 1947, and will make France one of the largest steel plate producers in Europe.

Standard Sand from DSIR

A new batch, the second to be prepared, of standard sand for the determination of the agglutinating value of coal according to British Standard Specification No. 705 is now available. It has been prepared by the Fuel Research Station, Department of Scientific and Industrial Research. The sand will be supplied in 7 lb. tins, costing £1 3s. (post paid in the United Kingdom). Applications should be addressed to: The Director, Fuel Research Station, Blackwall Lane, Greenwich, London, S.E.10.

COLD PRODUCTION OF TIN PLATE

U.S. Methods of Controlling Gauge

TO meet a heavy demand for high grade tin plate and sheet, the Columbia Steel Company, a subsidiary of the U.S. Steel Corporation, has just completed installation of a new modern continuous cold reduction mill at its Pittsburgh (California) plant. Said to be one of the largest and highest speed now in operation, the 56-in. five-stand tandem mill is capable of rolling coils weighing up to 30,000 lb. and can handle hot-rolled, semi-finished material up to 54-in. in width. The finished coils will be 20 in. inside diameter and up to 60 in. outside diameter.

Seven Minutes to Roll

When rolling tinplate stock, the steel will enter stand No. 1 at 0.125 in. to 0.0115 in. thick. For sheets, the entering thickness will be 0.1875 in., and it may be finished at from 0.012 in. to 0.105 in. thick. A coil of 0.008 in. steel 60 in. in diameter would contain approximately five miles of strip and can be rolled in about seven minutes when the mill is operating at its nominal rating of 3900 r.p.m.

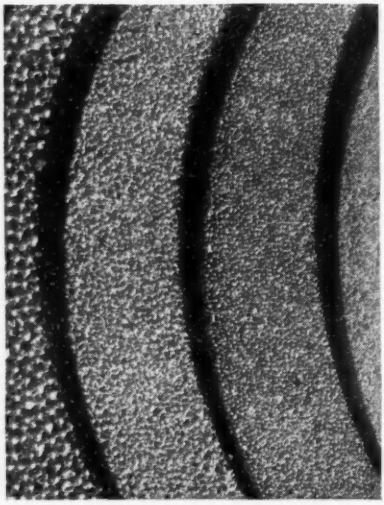
The control of the mill is of the adjustable voltage type in which the speed of the motors is governed by controlling the voltage of the generators. However, variations and refinements of the conventional adjustable voltage control have been made to take care of variable conditions in cold rolling and to provide the necessary stability and speed of response to cope with the transient phenomena which are encountered.

To achieve load balance between the two motors, which are mechanically connected with their armatures in parallel in the case of stands 3, 4, and 5, an amplidyne type load balance exciter is connected in series with the field of each unit. This exciter either bucks or boosts the excitation voltage supplied by the motor field exciter by an amount necessary to maintain an approximately equal division of loads.

The tension reel, like each of the mill stands, operates from its own individual generator. Its control is also of the adjustable voltage type with the voltage controlled in proportion to the speed adjustment of the No. 5 mill stand.

Mill screws and tension on the material are the two chief methods of controlling gauge. Tensiometers, which actually measure the tension of the steel, have been installed between each pair of mill stands. These give a continuous indication of the tension, thereby permitting an operator to make use of tension in controlling gauge without fear of exceeding allowable values.

The five-stand tandem, continuous cold reduction mill, recently installed in the Pittsburgh (California) plant of the Columbia Steel Company, a subsidiary of the U.S. Steel Corporation. First of its kind to be erected on the Pacific Coast, the mill is capable of rolling coils weighing up to 30,000 lb.



Indicating the wide range of gradations in which typical metal powder products are now produced

(Courtesy of Sintered Products, Ltd.)

Porous Metal Uses

Versatile Powder Products

ALTHOUGH current applications of powder metallurgy are still sufficiently new to give the impression of very rapid development it is questionable whether the rate of industrial application has justified the great prospects which have been apparent for some time.

That certainly appears to be true in the American counterparts of our own metal powder industries, where the extent of the use of iron powder, in particular, has not come up to expectations. The estimated output of iron powder in the U.S.A. this year is only 18,000 tons and the price accordingly remains around 8-12 cents per lb.

Of the newer developments it is thought that the principal two are the production of pre-cast powders and the hot pressing of powders. The latter is said to be still more or less in the experimental stage but already it offers the advantage of working at pressures much lower than hitherto.

Another development may possibly be found in a combination of cold and hot pressing, *e.g.*, for aluminium alloys, as claimed in a recent patent application of the Soc. An. pour l'Industrie de l'Aluminium in Switzerland (Eng. pat. application No. 18835/1947). The subject matter covers light metal bodies and methods of manufacture, and endeavours to remove the liability of aluminium alloys to adverse effects from temperatures over 200° C.

The specific weight of these new alloys from powders should not exceed 5 g./c.c., preferably about 3 g., with a tensile strength exceeding 30 kg./mm.^{2} and Brinel hardness of more than 80 kg./mm.^{2} even in the annealed state.

They are prepared by compressing and sintering Al powder, pure or alloyed, of such fineness that at least 50 per cent has particle fineness $<2\mu$. The powder may be produced by any known method, such as stamp or ball mill. The alloy constituents may be Mg, Cu, and/or Si, and may be incorporated in the known manner.

The method used may be one of the following: (a) cold pressing, sintering, hot pressing; (b) cold pre-pressing, hot pressing, and sintering; (c) hot pressing and sintering. By cold pre-pressing is understood a pressure of 2 tons/cm.^{2}. Hot pressing is done above 400° C., preferably 550-600° C., and time will vary according to conditions and kind of product required.

Hot working, such as extrusion at about 450° C., is also said to be beneficial. Control of oxide content is important, for some of the "unexpected" properties obtained are due to oxide films. The products are particularly suitable for use at high temperatures, for i.c. engine pistons and rings, turbine blades, etc.

Bearings, Catalysts and Filters

Another field in which real progress may be claimed is possibly among the oldest in powder metallurgy, namely, in the manufacture of porous products, for bearings, for catalysts of remarkably large surface area—as described in a paper read at the recent Cleveland symposium on surface chemistry by Chas. J. Hardy—and especially for filtering and similar purposes. This latter is of particular interest, and is one in which this country is taking a leading part.

There has long been a need for a porous material of high mechanical strength, ductility, and shock resistance as compared with ceramics, offering good heat and corrosion resistance and permitting fine filtration with low resistance to flow. When, in addition, the material is capable of being welded, soldered and machined it undoubtedly meets many of the varied requirements of the chemical and allied industries for filtration, aeration, distribution, etc. It is

of obvious value wherever the flow or mixing of gases and liquids is involved, as it is also for catalysis, where large surface area per unit volume is required.

Porous bronze bearings, of course, have long been known; but a more recent application of porous metal components is in aircraft de-icing equipment, as developed, *e.g.*, by T.K.S. (Aircraft De-Icing), Ltd.

It is probably in the filtration and allied fields that some of the more interesting developments, present and potential, are to be found; and, while some are still in the experimental stage, numerous important industrial applications have been established for such material as Porosint (Sintered Products, Ltd.).

This is mainly bronze, but research has for some time being occupied with other metals and alloys: copper-nickel, copper-nickel-tin, etc.

The principal shapes for such units available are shown in the accompanying illustrations, one of which also reflects the varying range of porosity obtained. Strictly controlled porosity is, of course, an essential feature; and at present five different grades are produced. They are :—

Grade	Max. particle to pass (in.)	Recommended thickness for filtration (in.)
A	.0001	1/16
B	.0002	1/16
C	.0005	3/32
D	.001	3/32
E	.0015	1/8

The material can be bonded with steel, copper, nickel and their alloys and made integral with the solid metal, thus in many cases simplifying assembly of units. It can also be resistance-welded or soldered, provided precautions are taken to prevent blinding of pores over too large an area. This surface pore-closing may also occur in machining, which should be used only for registering purposes.

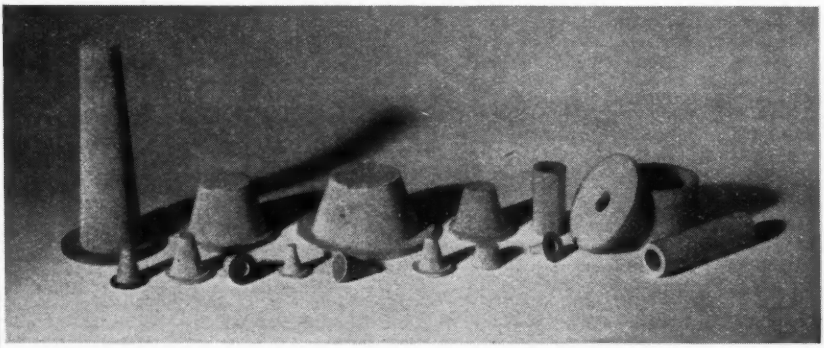
Filters made of this material have now been in regular use for some time for filtration of oil engine fuel, petrol, and paraffin; and have proved particularly suitable where the fuel is injected, since fine filtration is needed to prevent choking of nozzles, and the filter must be robust.

Other Uses

In the mixing of gases and liquids, among many varied uses may be mentioned that of the distributors for fermentation in the manufacture of yeast; and in the production of cresylic acid where copper-nickel-tin distributors, similar to those used in aircraft de-icing, permit much lessened aeration time.

An interesting account of the manufacture of porous metal for these and other purposes, with some of the underlying principles involved, was given by C. E. Sinclair in the powder metallurgy symposium last year (Iron and Steel Inst. Spec. Rep. No. 38). Particular attention must be given to particle size for which the makers have evolved their own special and very effective methods, with which porosity control is intimately connected.

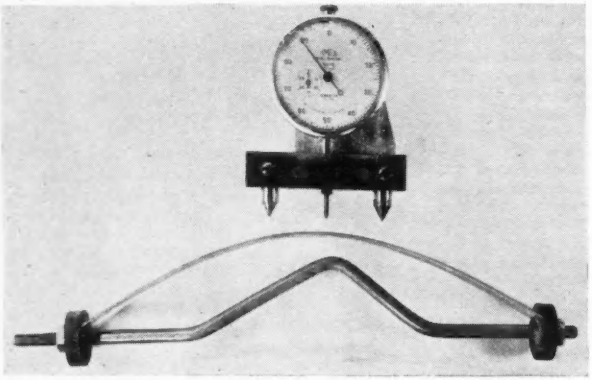
Another important consideration is corrosion resistance. This naturally has formed the subject of numerous tests, some results of which were reported by M. M. Hallett (*J.S.C.I.*, 1948, *67*, 57-61, February). Briefly, the conclusions were that corrosion rates with porous bronze are not appreciably different from those of solid bronze of the same composition.



One of the more obvious advantages of the powder metal technique is the case with which small porous components can be fabricated in quantity

STRONG ALUMINIUM ALLOYS

Scientific Tests of Stress and Corrosion Effects



The dial gauge shown here measures with accuracy of 0.0001 inch the deflection of a specimen of strong aluminium alloy stressed by bowing. When the two outer fixed pins below the dial are placed on the arc formed by the specimen the central movable pin, attached to the plunger of the dial gauge, is displaced proportionately to the curvature of the specimen

FRESH tests and methods for determining the resistance to corrosion of a number of new high-strength aluminium alloys have been developed by Hugh L. Logan and Harold Hessin, of the U.S. National Bureau of Standards.

Marine Atmosphere Exposure

Stressed samples of these alloys, which are increasingly in demand for use in heavier and faster aircraft, have been submitted to accelerated tests in corrosive solution, and a high degree of correlation was achieved between the results of the laboratory tests and marine atmosphere exposure tests of the same materials under similar conditions.

The Duralumin type 4 aluminium-copper-magnesium alloy, known as 24S-T, was introduced in 1932, and within a decade, had largely replaced other aluminium alloys as sheet material for aircraft construction.

Although its resistance to corrosion was generally acceptable, under some conditions it was appreciably attacked upon exposure to a marine atmosphere or seawater. To increase resistance to this, it has been used in the form of a "clad" alloy, a Duralumin sheeting being integrally bonded to and sandwiched between two thin protective layers of commercially pure aluminium, but this resulted in some sacrifice of tensile strength. This material was found to be adequately resistant to corrosion in service, and has since been used as a standard of comparison in the marine-atmosphere testing of new alloys.

During the war, efforts were made to develop alloys of greater tensile strength with an adequate corrosion resistance. In the R301-T alloy, this result was sought by covering a Duralumin type alloy with an alloy-cladding layer of higher strength than commercially pure aluminium. In the 75-ST and R303-T alloys, tensile properties were improved by the addition of appreciable amounts of zinc. Use was also made of the discovery that elevated-temperature ageing of the commercial flat 24S-T alloy results in a marked increase in yield strength.

In the bureau's investigation of the stress-corrosion resistance of these new materials, standard ASTM flat tensile specimens with ½ in. reduced sections were tested in the laboratory and in a marine atmosphere under a stress equal to three-fourths of the yield strength.

Corrosive Conditions

In the laboratory, stressed samples of all alloys were continuously immersed in a sodium chloride-hydrogen peroxide solution (NaCl, 57g; 30 per cent H_2O_2, 10 ml; H_2O, 990 ml.); those containing zinc as an alloying element (R303-T and 75-ST) were also exposed in a boiling 6 per cent solution of sodium chloride. Unstressed specimens were subjected to the same corrosive conditions in order that the effect of stress in increasing corrosion damage could be evaluated. All clad materials were tested with the cladding intact, since the purpose of the tests was to determine the resistance of the commercial alloy as actually used rather than that of the core material itself. Losses in ultimate tensile strength and per cent elongation were taken as criteria of corrosion damage.

Specimens supported vertically and stressed by means of weighted levers were tested in the sodium chloride-hydrogen peroxide solution. Samples up to 0.064 in. thick were kept in the solution for 24 hours. One-eighth inch specimens were immersed for 72 hours, the solution being renewed each 24 hours. Breaking of a specimen under stress automatically opened a knife switch in the circuit of a solenoid counter actuated once every six minutes by a clock.

After removal from the solution and cleaning, the specimens were broken in a hydraulic-type tensile testing machine to determine the tensile properties of the corroded material. Metallographic examinations were also made to determine the types of corrosion that had developed. For marine-atmosphere exposure tests, the specimens were supported and stressed in a similar fashion but were left exposed to the atmosphere.

Stressing by Bowing

Specimens immersed in boiling sodium solution were stressed by bowing, accomplished by a device consisting of a threaded Monel rod, and insulating slotted washers. The specimens were then placed in wide-mouthed flasks connected to reflux condensers and containing the sodium chloride solution. They remained in the boiling solution for 14 days unless earlier failures occurred. At the end of this time the specimens were removed, cleaned, and broken in tensile tests.

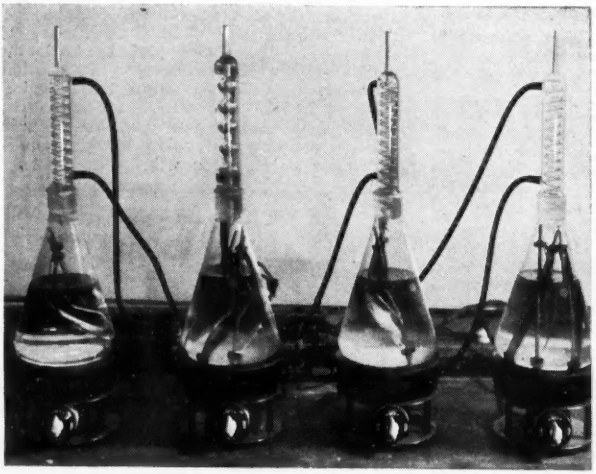
The results of the investigation indicate that flat, bare 24S-T aluminium alloy sheet aged four hours or longer at 375° F. is not susceptible to stress-corrosion cracking in either the laboratory or marine-atmosphere tests, and is at least as resistant to the combined action of stress and corrosion as the commercially heat-treated but unaged material.

Yield Strength

It was found, the bureau reports, that ageing of a sample of this alloy for three hours at 385° F. produced an increase in yield strength of about 25 per cent above an initial value of approximately 50,000 lb. p.s.i., an increase in tensile strength of about 3 per cent above an initial value of approximately 70,000 lb. p.s.i., and a decrease of about two-thirds in the initial elongation of 17 to 18 per cent. Similar results were obtained when the material was aged for 20 hours at 350° F., five hours at 375° F., or one and one-half hours at 400° F.

The samples of the other alloys that were tested, with the exception of R301-T, were found adequately resistant to stress-corrosion cracking. The failure of the R301-T samples was the result of the penetration of stress-corrosion into the core material at the machined edges of the relatively narrow (¼ in. wide) specimens that were tested. Such damage, the bureau concluded, would probably not be significant in wide sheets, particularly those cut by shearing.

In general, it was apparent that the short-time laboratory tests developed by the National Bureau of Standards give a good indication of the corrosion resistance to be expected of the unclad alloys in a marine atmosphere.



The stress-corrosion resistance of aluminium alloy sheet containing an appreciable amount of zinc is determined by continuous immersion in a boiling six per cent sodium chloride solution. Specimens, stressed by bowing, are shown in wide-mouthed flasks connected to reflux condensers and containing the corrosive solution

Oxygen in Iron and Steel Production

Means of Increasing Output and Reducing Costs

OXYGEN already has well recognised functions in the iron and steel industry as a versatile tool for cutting, shaping, and fabricating steel. In the production of liquid steel and of pig iron, it is less well known, and the possibilities are not as yet so fully explored. This new field, however, seems to deserve the closest attention from the steel maker since it offers prospects of increasing output, improving quality, and reducing costs.

In *Oxygen, Its Potentialities in Iron and Steel Production*, the British Oxygen Co., Ltd., shows a number of interesting results of collaboration with the steel industry through the British Iron and Steel Research Association in a programme of co-operative experiments.

Furnace Uses

The use of oxygen is explored in the open hearth furnace, in the Bessemer and Tropenas converters, in the electric furnace and in a number of full-scale trials at chosen works.

In both blast and open hearth furnaces, it is pointed out, gas from the furnace which is used in stoves or regenerators for pre-heating could be released to provide energy for the production of oxygen.

Thermal economies in all iron and steel making equipment which burns purchased fuel to generate heat can be effected by the use of oxygen; the advantage becomes greater with higher temperatures, since regenerators become progressively less efficient as the temperature rises. Saving in fuel, or alternatively a reduction in capital cost of the heat exchange equipment, are made possible.

In open hearth steel making the objection to the use of oxygen in the main air stream is that air leakage into the furnace is so high that a considerable quantity of oxygen would be required to have any appreciable effect, and there is a risk of noticeable loss of the oxygen added.

With the present type of furnaces direct improvement in thermal efficiency by the addition of oxygen is not a practicable proposition, but with this object in mind it seems that furnace designs might in future be modified to provide a real saving.

Oxygen has been used to shorten the melting down period by directing oxygen through jets installed in the furnace roof or to pre-heated scrap, so as to cut it down in front of the main burner and make room for the flame. In this way more fuel can be burnt and time saved when the scrap is being melted.

The importance of regenerators decreases when oxygen is employed, and it therefore seems feasible that in special cases they might be dispensed with altogether. This might be appropriate when the fuel is powdered coal, which has been difficult to utilise in steel melting owing to its rapid clogging action on the checker brickwork of the regenerators by the fine ash or dust.

In Bessemer converters, it is stated that quality is improved by the use of oxygen to lower the nitrogen absorption.

The rôles of high purity, medium purity, liquid and gaseous oxygen and "tonnage oxygen" are compared and the costs of medium purity oxygen set out.

Prior to 1902, commercial oxygen was produced by a chemical method, involving the heating of barium peroxide and regeneration in a current of air. Some oxygen was, and is, made as a by-product in plants producing electrolytic hydrogen, but this method is said to be uneconomical when oxygen is the main product. The selective absorption of air in water has been suggested, but the best method is by rectification of liquid air. A series of diagrams illustrate five different processes.

The whole volume is well produced, with clear print on good quality paper, and there is a comprehensive bibliography.

£10,000 for Tropical Medicine.—The Liverpool School of Tropical Medicine has recently celebrated the 50th anniversary of the school's foundation, and to mark the event a "birthday present" of £10,000 has been given by the directors of the Liverpool firm of African shippers, John Holt & Co. (Liverpool), Ltd., to be used for work in the Department of Tropical Medicine under Professor B. G. Maegraeth.

GERMAN SALTCAKE AND HCl

Technical Descriptions of Typical Equipment

BIOS Final Report No. 1789 gives details of saltcake and HCl manufacture in the Mannheim district and Grevenbrück, by Th. Goldschmidt A.G., Kalichimie A.G., and Ges. f. Chem. Ind. Illustrative documents can be inspected at the Technical Information and Documents Units, German Division, 40 Cadogan Square, London, S.W.1, quoting ref. Nos. BIOS/Docs/3290/2968/1/1-12 for Goldschmidt plant and do. do./2/1-10 for Ges. f Chem. Ind.

The Goldschmidt equipment comprises two Vetterlein-Zieren, one Lurgi furnace and an HCl absorption plant. The former, originally with seven hearths, now have four. One furnace is direct-heated by producer gas and the other by waste heat from a rotary calciner.

The Vetterlein type plant consists of a brick cylinder reinforced by steel bands, with hollow shaft, air-cooled and of sufficient diameter to permit of a man entering. This is stepped in a cast iron heel step and rotated by bevel and pinion at about 0.5 r.p.m., being retained in position at top by a guide ring in the roof. Rabble arms are fixed (from inside) and carry rabbles in the form of sleeves which are easily renewable.

The raw materials are rock salt and sulphuric acid from the firm's own contact plant of 95 per cent strength. The salt is delivered by elevator into hopper at the top, whence it passes into a worm feed and is mixed with acid to form slurry which, by the rabbles, is reduced to a fairly thin even layer without caking. It is thus fed down through the hearths counter current to the rising heating gases. It then passes out into a steel worm conveyor working in a mild steel tunnel. HCl gas and other products of combustion pass through a pipe to the absorption plant.

Third Vetterlein Plant

It is hoped to install a third Vetterlein plant with output of 14-15 tons sodium sulphate per day, as compared with 11-12 tons of existing furnaces. The saltcake contains 0.6-0.7 per cent NaCl and about 1.5 per cent free H_2SO_4. The fuel for one of the producer gas heated furnaces is 10 kg. coke per 100 kg. saltcake and the exit temperature of gas is 320°C.

The other furnace is of the well known Lurgi-Leverkusen type on the Mannheim principle, *i.e.*, single-hearth muffle type, with mechanical feed and stirrer. This was not working at the time of the visit. Some minor modifications have been made by Goldschmidt, including an asbestos rope covering for rabble arms, rabbles, and central shaft, and improved feeding similar to that of the Vetterleins. The output is about 10 tons/24 hours. Heating is by producer gas but requires 20-25 kilos fuel/100 kilos saltcake. HCl concentration is somewhat higher than with the Vetterlein furnaces.

HCl Absorption

The HCl absorption system is a modified Zieren plant in which a small percentage of output has a fairly high H_2SO_4 content so that the bulk of the HCl is as free as possible from H_2SO_4. The plant is in two sections: first, two towers in series and two filters in parallel, working under suction, second, two absorption towers in series and a washing tower under pressure.

The equipment of Kalichimie A.G. included five Mannheim type furnaces built by Kalichimie, very similar to Lurgi. The working parts were covered with asbestos soaked in sodium silicate, together with powdered glass. The output is 9-10 tons per day of saltcake, and 14-15 tons of 30-32 per cent HCl; the fuel used is 1.7 tons a day. Between the furnace and absorption plant a pre-cleanser was installed into which water was sprayed at the rate of 8-10 litres per hour. At the time of the visit the plant was not working, and the absorption side had been badly damaged.

The plant of Ges. f. Chem. Ind. at Grevenbrück is much smaller, with an output of 250 tons of saltcake per month, together with 430 tons of 30 per cent HCl. The equipment includes one hand-operated Zahn plant on the pot and muffle principle heated by gas producer, and an HCl plant also by Zahn (Berlin). The life of the pots was stated to range from three to nine months. Normally two men per shift can run the plant, but it was not working at the time of the visit owing to the difficulty of getting suitable labour. Here, too, a small precleaner or cooler is installed between furnace and HCl unit. This latter consisted of 45 tourils in three rows followed by two washing towers in parallel over which HCl of 7-15 per cent strength flows but is not circulated. The towers were 8-9 m. high with cross section area of 1m², and were packed with Raschig rings. Owing to the presence of As in the Meggener pyrites used for H_2SO_4 production, treatment of the HCl with H_2S was necessary for its removal.

A CHEMIST'S BOOKSHELF

Chemical Calculations: J. S. Long and H. V. Anderson. McGraw-Hill Book Company, Inc., New York. 1948. 5th Ed. Pp. xiii + 401. $3.75.

Most of us would agree on the necessity for grounding chemists thoroughly in the methods of chemical calculation. Equally, most of us would admit that far too many students, ourselves perhaps included, have not received this necessary attention. The present edition of a well-known text-book —one of the admirable International Chemical Series—provides a very useful and comprehensive discussion of the elementary methods of chemical calculation, together with a wide variety of problems based on the discussion. Starting right at the beginning, with the units of mass, volume and temperature, the book takes the reader through all the usual elementary work on equations, equivalents, volumetric work and so forth, to the level of simple electrochemical problems, the law of mass action, and solubility product. It is approximately appropriate, in other words, to the standard required by the Intermediate B.Sc. examination in this country, except, perhaps, on the physicochemical side, where there are a few omissions. As training for the conscientious student, who can be persuaded to work a reasonable proportion of the problems, the reviewer regards the book as admirable. Comprehensive revision, to lay particular stress on dimensional units, and to standardise nomenclature and symbols, have increased its value. Indeed, it would not be impossible for more advanced chemists, conscious of a weakness on the mathematical side, to derive benefit from an hour or so spent on turning the pages with attention each week.

There are one or two criticisms that seem worth while. The discussion of the atomic theory with reference to the build up of electronic shells is perhaps a little too simplified, since it gives no hint of the formation of transitional elements by the filling of inner levels. The idea is not too difficult for an elementary student to grasp, and the failure to introduce it at this stage may form a picture in the student's mind which will make the conception more difficult to grasp at a later stage. Again, there is no indication, in the chapter on solubility product, that this phenomenon is *not* the truth, the whole truth and nothing but the truth about the precipitation of the insoluble sulphides. It is regrettable that the interdependence of solubility product theory and the insoluble sulphides seems as permanent as, in an earlier age, the phlogiston theory. It is perhaps too much to expect that all text-books should cut out this anomaly until they can supply a simple exposition of a more rational and up-to-date theory; but at least anyone who tackles the problem, on paper or in class, should insert a warning that for this purpose solubility merely offers a rough and ready, and all too frequently a misleading rule of thumb, and that solubility product is not the corner-stone of analytical chemistry that it is so frequently represented to be. It may be argued that it took leading chemists ten years after the Braggs' work to accept their ideas in the field of strong electrolytes, but these ideas are now such common chemical knowledge that even the average student must have his faith shaken by the unblushing application of the law of mass action to silver chloride. And when he later finds a problem which suggests to him, in defence of his practical experience, that cobalt sulphide will be precipitated by H_2S in a solution that is 1.2 N in HCl, he may be forgiven for divorcing, even more than is his wont, the fields of theory and practice.

In the preface, the authors state that "the use of the slide rule is to encourage in chemical calculations" but, though they give a full appendix on the use of logarithms, they give no instruction on how to handle a slide rule. The appendix on significant figures, also could well be supplemented by an elementary statistical treatment of precision which, in view of the growing importance of statisical method in chemistry, would provide a useful introduction, and a none-too-early one, to a necessary part of the mathematical training of the complete chemist. These criticisms are offered to the authors in a helpful spirit, as attempting to indicate ways in which, in the opinion of the reviewer, a valuable elementary text could be made even more useful to students.

Technical Publications

THE characteristics and uses of aluminium paint and paste with information on painting technique, storage, properties, and testing are dealt with in "BA Aluminium Paste," the latest publication of the British Aluminium Co., Ltd. This is a book for the user, and is excellently produced and illustrated to present a permanent short reference work for the increasing numbers taking advantage of the high quality of resistance of coatings incorporating aluminium metal. Aluminium paste contains about one-third its weight of mineral spirits, is cleaner to handle and easier to mix than the dry aluminium flake powder. Considerable space is also saved in storage.

* * *

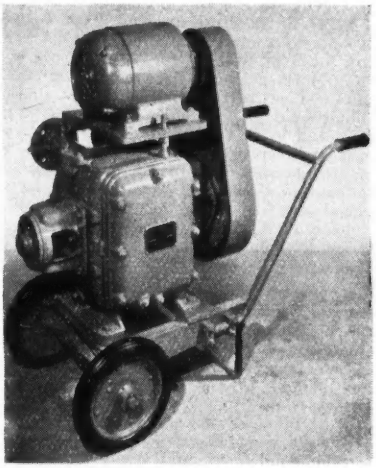
A useful increase of rubber technology is continually afforded under the U.S.-U.K. liaison scheme compiled by the Research Association of British Rubber Manufacturers from American and other sources, of which the current "supplementary Reports on Synthetic Rubber" (HMSO Supplement No. 8819) is a good example. This comprises three sections of the subject, GR-S Latices and the properties and testing of GR-S Vulcanised and GR-S Unvulcanised. The section dealing with unvulcanised GR-S contains most of the fundamental matter, presented in the form of short abstracts, dealing with such subjects as the free radical reactions with rubber, evaluation and selections of a GR-S polymer and rheological tests on GR-S. The "vulcanised" section is concerned with practical studies of products, heat generation in tyres and air permeability.

* * *

"Materials and Methods Manual," published at periodic intervals by the Aluminium Association, New York, deals in its last 15 pp. number with aluminium alloy castings. This discusses the various alloys, advantages and disadvantages of the different casting methods and design limitations, and gives information on finishing of all types of castings. Besides many figures and tables, the review is completed by a bibliography on its particular subject.

* * *

"Facts About Philips" is a new booklet, profusely illustrated, which describes briefly the whole wide range of products of Philips Electrical, Ltd.—radio, television, lamps, high frequency generators, industrial diamond dies, welding machines, medical equipment, etc.



Mobile pump with V-belt drive from an overhead mounted motor on a hinged base plate suitable for pumping liquids for short periods

(Megator Pumps & Compressors, Ltd.)

Workers' mid-day meals have been the subject of considerable attention recently, including letters to the daily Press. "A new approach to Production" by H. V. Black, published by Intel (Caterers), Ltd., comes at an appropriate time. Men, machinery and materials are the three factors on which production depends, and all too often, as this booklet points out, the actual physical welfare of the human being is neglected. Intel, Ltd., claims to approach this matter in a new way, and the "Intel plan recognises that feeding the employee where he works is fundamentally an industrial operation and not a catering one."

* * *

Zinc Development Association, Lincoln House, Turl Street, Oxford, is offering freely to those who need it a new booklet on galvanising called "Hot-dip Galvanising and Rust Prevention" (52 pp.). The story of the development of galvanising is clearly told, the scientific side being well described in simple terms. This excellent survey of a difficult subject can be recommended.

D

Personal

AMONG the newly elected Fellows of the Textile Institute are DR. PAUL LAROSE, of Ontario, Canada, and DR. WILLIAM SIMPSON SHAW, of Manchester. Dr. Larose, who has published a number of works on textile subjects, was textile adviser to the Canadian Department of National Defence during the war, and was awarded the M.B.E. For the past eighteen years he has worked as research chemist with the National Research Council in Canada. Dr. Shaw is an external assessor of M.Sc. theses for Manchester University, and a member of the research control committee of the Wool Industries Research Association.

PROF. DR. MAX HARTMANN, a member of the board of the Ciba, A.G., Basle, and chief of the company's pharmaceutical research division, has recently been awarded the title of Doctor of Technical Sciences *honoris causa* by the Federal Technical Institute (ETH), Zurich. Dr. Hartmann, who had studied at Zurich and Munich under Baeyer, Willstätter and Wieland, has done distinguished research work in organic chemistry and pharmacology. Dr. Hartmann's chief discovery is the sulphonamide Cibazol (1938) and a second member of this group, Elkosin (1941). Over one hundred patents have been taken out in his name.

DR. T. REICHSTEIN, who holds the chair of chemistry at Basle University, has been awarded the Marcel Benoist prize for 1947 for his outstanding research work and discoveries in the field of vitamins and hormones. This prize of 20,000 Swiss francs is awarded annually to a Swiss scientist—or any scientist who has been a resident in Switzerland for five years—who has in any particular year made the most useful scientific discovery, invention or research, particularly in those branches of science which are of importance to human welfare.

SIR EDWARD APPLETON, secretary of the Department of Scientific and Industrial Research, has been awarded the Valdemar Poulsen gold medal by the Danish Academy of Technical Sciences for his contributions to radio technics and particularly achievements in research on the ionosphere. Sir Edward has also been appointed principal and vice chancellor of Edinburgh University, in succession to Sir John Fraser, the surgeon.

The following officers have been elected by the Pharmaceutical Society of Ireland, of which membership now exceeds 900. MR. P. A. BRADY, president; MR. T. C. SCOTT, vice-president; MR. J. GLEESON, treasurer, all re-elected. Council members: MESSRS. M. COSTELLO, R. DALY, P. BROOKE-KELLY, J. P. KISSANE, A. A. TOHER, C. D. O'SHEA and SENATOR F. LOUGHMAN.

At the meeting of the general council of the British Standards Institution the following officers were elected: MR. ROGER DUNCALFE, chairman of the general council; MR. JOHN RYAN, chairman of the finance committee; MR. HERBERT J. MANZONI, chairman of the Building Divisional Council.

FURNACE COKE SUPPLIES

ASKED by Mr. Erroll, in the House of Commons last week, what steps he was taking to ensure that greater supplies of furnace coke were made available to the iron and steel industry, Mr. Gaitskell (Minister of Fuel and Power) said, apart from the fact that the National Coal Board had standing instructions to meet in full the coal requirements of all coke ovens, special arrangements had been made for the production of furnace coke at certain Coal Board ovens and at part of the Beckton Gas Works where formerly coke of this type was not manufactured. In addition, supplies had been diverted from other consumers who were in a position to use gas coke instead of furnace coke. Mr. Erroll asked if these plants would remove the bottleneck in furnace coke which hitherto had impeded output of steel. Mr. Gaitskell said he thought that so far as next winter was concerned there should be no interference at all. The long-term position depended on the development of the programme for additional coke oven plants.

Students in Industry

The Royal Technical College, Glasgow, will repeat next January the successful experiment which was initiated this year with its final-year applied chemistry students, who are virtually chemical engineering technicians ready to enter industry. With the co-operation of many leading firms, these students will spend two to four weeks as guest workers on the management side of these undertakings studying industry in action and assessing industrial practice against the theory and training already given. Industrialists who co-operated a year ago were satisfied that the experiment was a good one.

Home News Items

Vermiculite Produced in England.—Dohm, Limited, announces that it has started producing vermiculite at its Stoke-on-Trent works. This is the first commercial vermiculite project in this country.

Safety in Chemical Works.—In recognition of the success of the recent conference at Harrogate on accident prevention in chemical works, the Association of British Chemical Manufacturers has arranged for a similar meeting to be held at the Royal Hotel, Scarborough, from Friday, October 7, to Sunday, October 9, 1949.

Recovering Fish Waste.—Fish offal which in the past has been tipped into the sea at Peel, Isle of Man, will in future be processed to produce oil and fertilisers. A local company has been formed to develop this new industry at the principal Manx fishing port, where the bulk of the island's herring catch is landed in the summer months.

Price of Rosin Reduced.—The Board of Trade announces that as from December 1 the price of rosin sold through the agency of United Kingdom Naval Stores Association, Ltd., 46 St. Mary Axe, London, E.C.3, is reduced as follows: Subject to availability, any buyer prepared to take delivery in a lot of 50 tons or more on cost and freight terms, with marine insurance covered, will be able to do so at a reduction of £2 per ton on the current ex-warehouse price for all grades.

To Weymouth.—The Bristol Instrument Co., Ltd., West Twyford, London, N.W.10, is removing on December 10 to a new factory at Weymouth which will permit very large expansion of production immediately and in the future, having been specially designed, and which has its own sports grounds and excellent staff amenities. There the company's entire range of instruments will be produced and the head office will be located. The Brent Crescent address will be retained as a London office.

Frustrated Exports.—The Board of Trade states that some wholesalers who are entitled to take the higher wholesale margins on their normal home trade are of the opinion that they may take these margins on sales of goods bought by them for export and now released for the home market as frustrated exports. The board holds that the price for the sale of these goods should be controlled by the Miscellaneous Goods (Frustrated Exports) Order and must in no case exceed the price paid, plus the amounts paid for storage, carriage, and insurance, plus 5 per cent on the total.

Benn Brothers, Ltd., Bouverie House, Fleet Street, London, E.C.4, proprietors of *The Hardware Trade Journal* with which is incorporated *Ironmongery*, have acquired the goodwill and copyright of *The Hardware Trades Directory*.

Share Quotations. — Arrangements are being made to introduce the ordinary shares of Bowmans Chemicals on the Liverpool and London Stock Exchanges at an early date. The shares are of 4s. nominal value fully paid, and will be introduced at about 7s. 3d., to include the final dividend.

Weekly Coal Output.—Last week's coal output in Britain fell after a period of successive increases, the total, which ranked eighth in the list of weekly figures since last December, being: 4,261,100 tons (4,082,400 tons deep-mined, 178,700 tons open-cast). Previous week: 4,320,800 tons (4,136,600 tons deep-mined, 184,200 tons open-cast).

Wire Ropeworks Fire.—Many thousands of pounds' worth of damage was done by fire at the works of the Whitecross Co., Ltd., wire rope manufacturers, Milner Street, Warrington, recently. The entire building, covering an area of 12,000 sq. ft., and housing valuable equipment and machinery, was burned out. The Whitecross Co., a subsidiary of Rylands Brothers, Ltd., employs nearly 12,000.

I.C.I's Non-Ferrous Metal Works.—Tractors and ground-levelling machines are working on the new 50-acre I.C.I., Ltd., factory site at Kirkby trading estate, Liverpool. The factory which is expected to cost about £1 million, will eventually give employment to 3000 men, producing copper tubes and other commodities, mainly for export. The site has a 900 yards frontage on the East Lancashire Road, and the factory, when completed, will be the largest of its kind in Europe.

"Migrant" Workers.—The chemical, soap and paint industries in Scotland are still affected by a shortage of female labour and see no immediate prospect of making good this deficiency. This in turn means that limitation of output arising from scarcity of labour, will be maintained. Efforts have been made repeatedly to bring back former skilled workers, now married, and some success has been obtained, but this effort has been offset by the high turnover of junior labour. Employers in Scotland believe that this situation will persist until there is more labour on the market than there are jobs.

Next Week's Events

MONDAY, DECEMBER 6

The Royal Institute of Chemistry (London and South-Eastern Counties Section). Acton Technical College, High Street, W.3, 7 p.m. A. Albert: "Drug Action, Ions and Neutral Molecules."

Society of Chemical Industry. London School of Hygiene and Tropical Medicine, Keppel Street, W.C.1, 6.30 p.m. Dr. H. Seligman: "Application of Radio-active Elements in Industry."

Hull Chemical and Engineering Society. Royal Station Hotel, Hull, 6.30 p.m. C. N. Hillier: "Pumps and Pumping."

TUESDAY, DECEMBER 7

Society of Chemical Industry (Chemical Engineering Group). Geological Society, Burlington House, London, W.1, 5.30 p.m. Dr. E. F. Edson: "Radiation Hazards and their Control."

Manchester Federation of Scientific Societies—Pharmaceutical Society. Papers on the new British Pharmacopoeia, Prof. H. Brindle and others.

Sir Halley Stewart Trust, Memorial Hall, Farringdon Street, E.C., 6 p.m. Prof. D. W. Brogan: "The Atomic Age. VI—America as Atlas."

WEDNESDAY, DECEMBER 8

Society of Chemical Industry (Food Group). BIRMINGHAM: University, Edmund Street, 6.30 p.m. Dr. L. F. Wiggins: "The Sugar Cane as a Source of Raw Materials for Chemical Industry."

Society of Instrument Technology. Manchester College of Technology, 7.30 p.m. Mr. Longworth: "Functional and Performance Characteristics of Automatic Temperature Control."

British Association of Chemists. Northern Polytechnic, Holloway Road, N.7, 7 p.m. W. P. Henderson: "Chemistry and the Railways."

Society of Dyers and Colourists. MIDLANDS SECTION: Loughborough, King's Head Hotel, 7 p.m. G. S. J. White: "Interfaces in Industry." NORTHERN IRELAND SECTION: Belfast, Queen's Hotel, 7.30 p.m. T. L. Mort: "Modern Bleaching, Dyeing, Printing, and Finishing Machinery" (illustrated by film).

THURSDAY, DECEMBER 9

Institution of the Rubber Industry. LEICESTER: College of Technology, 7 p.m. Discussion. Dr. W. McG. Morgan: "Carbon Blacks."

Society of Chemical Industry (Fine Chemicals Group). London School of Hygiene and Tropical Medicine, Keppel Street, W.C.1, 7 p.m. Dr. W. A. Sexton: "The Chemistry of Plant Growth Regulators." NOTTINGHAM. Microbiological Panel, joint meeting with Nottingham Section. F. C. Bawden: "Some Properties of Plant Viruses."

The Chemical Society. EDINBURGH: North British Station Hotel, 7.30 p.m. Dr. D. W. Kent-Jones: "Bread and its Influence on History." LONDON: Burlington House, Piccadilly, W.1, 7.15 p.m. W. A. Cowdrey and D. S. Davies: "The Kinetics and Mechanism of the Sandmeyer Reaction"; S. J. Gregg and R. I. Razouk: "The Kinetics of the Thermal Decomposition of Magnesium Hydroxide"; D. H. R. Barton and K. E. Howlett: "The Kinetics of the Dehydrochlorination of Substituted Hydrocarbons, Parts I, II and III." MANCHESTER: University, 6.30 p.m. Prof. C. K. Ingold: "Aromatic Nitration." NOTTINGHAM: University, 6.30 p.m. Reading of original papers.

British Ceramic Society (Refractory Materials Section). Royal Sanitary Institute, S.W.1, 10 a.m. (Two days.) Subjects include: "Effect of Heat on Clays"; "Deformation of Silica Refractories in Torsion"; "Ceramic Materials for Chemical Plants"; and "Zircon Refractories."

Institute of Metals (London Local Section). 4 Grosvenor Gardens, London, S.W.1, 7 p.m. E. Scheuer: "The Solidification of Metals, with special reference to Continuous Casting Processes."

FRIDAY, DECEMBER 10

Oil and Colour Chemists' Association. Engineers' Club, 2 p.m. Dr. J. K. Aiken and H. Jones: "Sebacic Acid Polyesters in Surface Coatings."

Royal Statistical Society (Industrial Applications Section, London Group). Mr. A. W. Swan: "The Functioning of a Statistical Department in the Steel Industry."

The Royal Institution of Great Britain. 21 Albemarle Street, London, W.1, 9 p.m. E. K. Rideal: "The Emission of Light in Chemical Reactions."

SATURDAY, DECEMBER 11

Institution of Chemical Engineers. MANCHESTER: College of Technology, 3 p.m. F. F. Rixon: "The Absorption and Desorption of Carbon Dioxide in or from Water, Using Packed Towers."

Overseas News Items

Belgium's Coal Output.—Belgium's coal output reached in October, for the first time since the war, the monthly average of the years 1936-38, *i.e.*, 2,431,000 tons.

Brazil's Alkali Industry.—Four important chemical concerns are to co-operate in developing the Brazilian alkali industry, based on rock salts from the deposits at Cotinguiba, near Aracajú in the State of Sergipe.

Cement in Argentina. — The Portland Cement Manufacturers' Association has announced that production in Argentina for the first nine months amounted to 1,032,997 metric tons compared with 876,488 metric tons in the same period last year.

Colombian Mining Enterprise. — The Empresa Siderurgica Paz del Rio has been established in Bogotá, Colombia, for the mining of iron-ore and hard coal. Its capital is 100 million pesos and it will have as technical advisers two U.S firms, the Koppers Company, and the Freyn Engineering Corp.

Finland Could Export Wolfram Ore.—Wolfram ore has for some time been known to occur in the Ylöjärvi (near Tampere) copper mines of the Outukumpu O/Y, and a recent survey of the economic possibilities of this deposit has shown that exports could be started on a small scale.

New Swedish Machine. — Woodpulp machines fitted with a new Swedish regulator are stated to have worked very satisfactorily. The regulator is connected to the valve which supplies water to the pulp. The slightest change in the concentration of the latter is at once transmitted to the regulator, which then makes the necessary adjustment.

U S. Chromite Deposits.—The exploitation of the chromite deposits in Washington, Cal., believed to be the largest in North America, is to start this month. The deposits, which extend into Oregon, are estimated to contain 4 million tons of chrome ore. The properties are controlled by the American chrome and magnesium industries.

India Suspends Some Sodium Imports.—The Government of India has decided to suspend the issue of licences for the import of caustic soda and soda ash from dollar and hard currency areas. Supplies are said to have arrived recently which have improved the stock position and licences for considerable quantities are outstanding. Restrictions on the distribution of these two alkalis have also been lifted.

Chemists' Club Golden Jubilee.—The 50th anniversary of the Chemists' Club of America will be celebrated by an informal dinner at the Clubhouse, New York, on Thursday next, December 9.

Aluminium Works Rebuilding. — The Aardal works, Norway, which were destroyed by fire, are expected to be rebuilt within the next 18 months or two years. Annual capacity will total 24,000 tons of aluminium.

Austria to Make Saccharine.—A factory in Vienna has recently taken up the manufacture of saccharine and expects to produce two tons monthly by the end of this year, sufficient to cover home requirements. An expansion of output, scheduled for next year, should leave an export margin.

U.S. Steel Output.—The highest output figure in the U.S. steel industry was expected to be attained last week, according to estimates by the American Iron and Steel Institute. Steel mill operations were planned at 100.1 per cent of rated capacity, with production at 1,804,300 tons.

Dutch Plastic Material.—The N.V. Chemische Industrie Magenta, Delft, Holland, is reported to be producing a new plastic material called Methacrylatarsen. Commercial output is to begin early next year. The company also plans to produce a number of other plastic materials.

Sweden's Iron Ore.—The Swedish Geological Inspection Department has reported that it would not be reasonable to expect that State to spend large sums on prospecting for iron ore deposits, since known deposits contain all the ore that can be transported and marketed under present circumstances.

Aluminium Companies Link Up. — Mr. Chifley, Australian Prime Minister, recently announced plans were being prepared for the link up of the British Aluminium Company and the Australian Aluminium Commission for the production of the metal in Tasmania. The British company had sent a representative to examine bauxite deposits in Borneo, the Solomons, and other Pacific islands.

Dismantling Krupps.—A British Military Government statement this week indicates that the greater part of the Krupps steelworks at Essen is to be disposed of or destroyed—222 to be disposed of and 22 destroyed, while 73 badly damaged buildings are to be demolished. Buildings numbering 127 will be retained for light industries. The demolitions will yield a large quantity of steel scrap for export.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

GLASS MACHINE & EQUIPMENT CO., LTD. Seven Kings. (M., 4/12/48.) October 29. £500 debenture to J. J. A. Dunham, Chadwell Heath; general charge.

NEW INSULATION CO., LTD. Gloucester. (M., 4/12/48.) November 2. £30,000 charge, to Equitable Life Assurance Society; charged on property fronting Bristol Road (formerly known as the Old Tramway Depot), Gloucester ,and three pieces of land adjoining. *£50,000. July 14, 1948.

F. T. SEAGRIM & CO., LTD. Cheltenham. (M., 4/12/48.) October 28. £4,500 (not ex.) charge, to Lloyds Bank Ltd.; charged on dwellinghouse and land with bungalow and outbuildings known as Barlands, Charlton Kings. *Nil. February 10, 1948.

IRISH ALUMINIUM CO., LTD. Dublin. (M., 4/12/48.) October 7, £37,500 debentures (50 debentures of £750 each); general charge; also October 7, mortgage in support of debentures for securing all moneys due or to become due to the Munster and Leinster Bank Ltd., on foot of an issue of 50 debentures of £750 each; charged on (1) Part of the lands of Nenagh South, Co. Tipperary; (2) piece or parcel of land at Nenagh South. *£25,352. April 7, 1947.

IRISH MOULDEX, LTD. Dublin. (M., 4/12/48.) September 24, debenture securing such sums as are now or shall from time to time hereafter become owing to the Munster and Leinster Bank, Ltd. on the balance of its current account; charged on premises held under lease dated November 12, 1947, being part of the lands of Strandfield, situate at Kerlogue, Forth, Co. Wexford, also general charge.

Satisfactions

PERMA-LED METAL CO., LTD. London, S.E. (M.S., 4/12/48.) Satisfaction October 26, of charge registered December 16, 1947 (re 55, 63 and 65 The Highway, Chelsfield).

RUBBER & TECHNICAL PRESS, LTD. London, S.W. (M.S., 4/12/48.) Satisfaction October 30, of debentures registered March 21, 1944, to the extent of £200.

Company News

Changes of Name.—The name of **M. Rink (Formerly Arnold Rink), Ltd.**, has been changed to **Wyndham Supplies, Ltd.**, and of **Q.D.P., Ltd.**, to **Service Paints, Ltd.**

The following increases in registered capital are announced: **Allied Colloids (Manufacturing) Co., Ltd.**, from £100 to £5500; **Allied Colloids (London), Ltd.**, from £100 to £600; **Basrah Petroleum Co., Ltd.**, from £9.8 m. to £10.5 m.; **Geigy Co., Ltd.**, from £20,000 to £400,000; **D. Hoyle & Co., Ltd.**, from £1000 to £2000; **Laboratory Suppliers, Ltd.**, from £3000 to £6000; **May & Baker, Ltd.**, from £265,000 to £662,500; **Mining & Chemical Products, Ltd.**, from £50,000 to £100,000; **Mosul Petroleum Co., Ltd.**, from £9.8 m. to £10.5 m.; **Petroleum Development (Qatar), Ltd.**, from £6,900,100 to £7,240,100.

New Companies Registered

Antitch, Ltd. (461,097).—Private company. Capital £5000. Manufacturing chemists, etc. Solicitors: Playne & Co., 9 Cavendish Square, W.1.

H. R. Browne (Chemists), Ltd. (461,332). Private company. Capital £2000. Manufacturing chemists. Directors: Mrs. E. M. Browne, Mrs. I. M. Clark. Reg. office: 44 Cornfield Road, Eastbourne.

Campbell & Mould, Ltd. (461,035).—Private company. Capital £1000. Manufacturers of chemicals and chemical processes. Directors: W. B. S. Campbell, Penlie Cottage, Warren Lane, Friston, Eastbourne; and H. A. Mould.

Pest Control Holdings, Ltd. (461,220).—Private company. Capital £1,000,000. To acquire the whole or part of the issued share capital of Pest Control, Ltd.; experts in all matters relating to the application of biology, hygiene and agricultural sciences, etc. Reg. office: Bourn, Cambridgeshire.

D. H. Roberts (Chemists), Ltd. (461,043).—Private company. Capital £5000. Chemists and chemical engineers, etc. Reg. office: Heygate Street, Walworth, S.E.17.

Chemical and Allied Stocks and Shares

BUSINESS in stock markets declined moderately earlier in the week, but with the beginning of the new Stock Exchange account buyers were more in evidence. After further gains, British Funds eased and there were small irregular movements in industrial

shares, although little selling was reported.

It is being assumed in some quarters that the yield factor must shortly switch investment buying from British Funds to leading industrials. Buyers of the latter are taking more than a short view, looking ahead to 1950, when it is assumed, voluntary dividend limitation may be lifted.

Chemical and kindred shares have shown firmness in accordance with the general trend. Imperial Chemical remained an active feature and at 49s. 4½d. yield slightly more than 4 per cent. Monsanto 5s. ordinary at 62s. 6d. yield rather less than 3½ per cent on the basis of last year's 45 per cent dividend. Laporte 5s. units have held their rise to 21s. 9d., Albright & Wilson (31s. 3d.) also kept last week's gain, Amber Chemicals 2s. shares were 9s. 6d., Fisons 59s. and Hardman & Holden 5s. shares were quoted at 27s. 6d. British Glues and Chemicals British Aluminium have held the rise which followed the success of the company's debenture issue.

British Oxygen (104s. 4½d.) remained active, the market assuming that when the company's expected new issue appears it is likely to take the form of an offer of additional shares on preferential terms to shareholders. There was further buying of Borax Consolidated on the belief that the uptrend in the company's earnings is continuing; and dealings up to 65s. were recorded. In other directions, De La Rue strengthened to 37s. 6d. still under the influence of the higher interim dividend, although it is realised the directors have stated that this does not indicate a bigger total payment for the year. British Match at 36s. 3d. remained firm on the hope that the Swedish Match Co., in which the company is a shareholder, may resume dividends 4s. ordinary remained at 20s. 3d. and at 50s. shortly.

Activity was shown in United Molasses up to the higher level of 51s. 3d. the assumption being that the tanker section of the business is earning larger profits and that the dividend will again equal 32 per cent. less tax. British Plaster Board at 23s. 4½d. have fully held their recent improvement, there being more confidence in the market that the dividend total may be kept at 25 per cent on which basis these 5s. shares would yield over 5¼ per cent. A feature has been buying of Glaxo Laboratories on further consideration of the financial results and chairman's annual statement; the price advanced to £20.

Iron and steel shares have been much quieter, and in some cases market prices receded below their "take-over" valuations, Guest Keen being 48s. 3d., Colvilles 37s. 9d., Staveley 90s. 3d. and Stewarts & Lloyds 56s. 7½d. Shares of companies not on the nationalisation list were mostly firm with Tube Investments slightly over £6½, and T. W. Ward 66s.

Turner & Newall at 80s. have been firm, reflecting the view that the results may show a further rise in profits. The 4s. units of the Distillers Co. have further strengthened to 29s. 10½d. Boots Drugs eased slightly to 56s. 3d., Beechams deferred were 18s. 3d., Sangers 34s. and British Drug 5s. shares changed hands around 9s. 6d. Oils remained uncertain, small irregular movements predominating. Shell were 76s. 10½d., Burmah Oil 69s. 4½d. and Anglo-Iranian slightly below £8⅞.

British Chemical Prices

Market Reports

STEADY trading conditions are again reported on the industrial chemicals market, with the movement to the main consuming industries continuing on a fairly substantial scale. The volume of inquiry for export also continues at a satisfactory level. The week has not seen any important price changes and quotations in most sections remain on a firm basis. There is little of fresh interest to report in the coal-tar products market. Creosote oil, cresylic acid and the pyridines are all in good request while pitch and carbolic acid are again active items.

MANCHESTER.—The Manchester chemical market continues to display a strong undertone in virtually all sections, although actual changes on balance for the week have been of little consequence. A steady volume of replacement business in the bread-and-butter lines has been reported on home trade account, with consumers in the textile and other industrial outlets pressing for good contract deliveries. On the export side, also, inquiries for shippers seem to have been maintained at around their recent level. In several sections of the fertiliser market, notably in the phosphatic materials, an active demand continues, and most of the tar products are in good request.

GLASGOW.—Conditions in the Scottish chemical market have shown little departure from normal during the past week, and there has been no unusual demand. Supplies coming from the south have been slightly delayed due to the weather, but sufficient stocks were available to buffer the delay. In the export market conditions have been a little better, import licences now being obtained in some countries a little more readily than in the past.

Patent Processes in Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted will be obtainable, as soon as printing arrangements permit, from the Patent Office, Southampton Buildings, London, W.C.2. at 1s. each. Higher priced photostat copies are generally available.

Complete Specifications Accepted

Anti-corrosion oils.—N.V. De Bataafsche Petroleum Maatschappij, and W. David. March 20, 1946. 609,687.

Process of manufacturing ferrous bodies containing silicon.—American Electro Metal Corporation. April 28, 1945. 609,689.

Production of polystyrene.—Distillers Co., Ltd., H. M. Hutchinson, and J. J. P. Studinger. March 20, 1946. 609,692.

Process for drying alcohols and ketones.—Distillers Co., Ltd., and G. H Twigg. March 20, 1946. 609,871.

Aqueous wax emulsions.—I.C.I., Ltd., and E. G. Cockbain. March 26, 1946. 609,698.

Storage of liquefied normally gaseous material.—W. W. Triggs. (Specialities Development Corporation.) March 21, 1946. 609,701.

Insecticidal preparations.—H. Hurst, and J. H. Schulman. March 21, 1946. 609,762.

Manufacture of piperidylketones.—Ciba, Ltd. April 10, 1945. 609,763.

Manufacture of polyphosphates.—Albright & Wilson, Ltd. March 22, 1946. 609,785.

Production of cellulose esters.—British Celanese, Ltd. March 30, 1945. 609,790.

Manufacture of highly polymeric esters.—W. K. Birtwistle. March 22, 1946. 609,792.

Fibrous materials.—I.C.I., Ltd. March 22, 1946. 610,096.

Mouldings from highly polymeric linear esters.—I.C.I., Ltd., J. S. Byers, J. C. Swallow, and J. M. Walter. March 22, 1946. 609,795

Herbicidal compositions.—E. I. Du Pont de Nemours & Co. March 22, 1945. 609,878.

Rotary fluid-pressure apparatus of the sliding vane type.—Cox Patent Rotary Pump, Ltd. March 25, 1946. 609,906

Preparation of derivatives of cholesterol.—Glaxo Laboratories, Ltd., A. E. Bide, R. J. Nicholls, and P. A. Wilkinson. March 25, 1946. 609,913.

Process for the manufacture of 4.2'-(substituted thiazolinyl) - 2 - substituted-oxazolones.—Therapeutic Research Corporation of Great Britain, Ltd., I. M. Heilbron, A. H. Cook, and J. A. Elvidge. March 25, 1946. 609,919.

Manufacture of pyrazine.—Soc. des Usines Chimiques Rhone-Poulenc — (April 11, 1945.)* (Cognate Application 9197/46.) 609,924.

Production of heat-sealable, transparent cellulosic sheets and films.—British Cellophane, Ltd. [March 27, 1945.]* 609,927.

Copolymers of vinyl chloride.—Distillers Co., Ltd., M. D. Cooke, and J. J. P. Staudinger. March 26, 1946. 609,940.

Dyeing of highly polymeric linear esters.—Imperial Chemical Industries, Ltd., A. S. Fern, D. McCreath, E. J. Vickers, and T. Vickerstaff. March 26, 1946. (Cognate Application, 9312/46.) 609,943.

Dyeing of highly polymeric linear esters.—Imperial Chemical Industries, Ltd., and T. Vickerstaff. (June 6, 1946.) 609,945.

Dyeing of highly polymeric linear esters.—Imperial Chemical Industries, Ltd., and A. S. Fern. (June 6, 1946.) (Cognate Applications 9310/46 and 9311/46.) 609,948.

Method of and apparatus for obtaining moisture regain in fibrous materials.—W. N. Hadley. March 28, 1946. 610,102.

Processes for dissolving crude calcium aluminates.—J. C. Seailles. March 22, 1939. 610,005.

Process for the preparation of 2-methyl-2.3-di-halogen-tetrahydrofuranes and their conversion to Vitamin B_1 and the like.—Chinoin Gyogyszer es Vegyeszeti Termekek Gyara R.T. (Dr. Kereszty and Dr. Wolf.) May 25, 1940. 609,803.

Contact apparatus for gas reactions.—Spolek Pro Chemickou a Hutni Vyroku. June 22, 1940. 610,007.

Preparation of complex metal amine salts.—A. H. Stevens. (Albi Chemical Corporation.) Dec. 13, 1943. 609,807.

Isomerisation of paraffin hydrocarbons.—A. H. Stevens. (Standard Oil Co.) Dec. 23, 1943. 610,009.

Fluorescent material.—British Thomson-Houston Co., Ltd. Aug. 14, 1943. 609,711.

Method and press for compacting metallic powder.—American Electro Metal Corporation. Sept. 1, 1943. 610,011.

Process for the production of pigments from cashewshell liquid or its constituents and derivatives.—K. G. Kudva, and H. R. Kamath. Oct. 4, 1944. 610,014.

Corrosion-resistant valves.—A. H. Stevens. (Pfaulder Co.) Nov. 1, 1944. 609,714.

Processes for cracking and/or hydrogenating oils, tars and like hydrocarbons.—T. O. Wilton. Nov. 20, 1944. 610,017.

Method of polishing an article having a surface of nickel or of a non-ferrous nickel alloy.—A. H. Stevens. (Battelle Memorial Institute.) Dec. 18, 1944. 610,019.

Production of plastic compositions.—Anglo-Iranian Oil Co., Ltd., E. S. Narracott, A. Millien, and J. N. Haresnape. Dec. 19, 1944. 610,020.

Manufacture of intermediates for dyes, especially photographic sensitising dyes.—Kodak, Ltd., and E. B. Knott. May 10, 1945. 609,814.

Reduction of molybdenum compounds.—Westinghouse Electric International Co. Jan. 7, 1943. 610,033.

Methods of and apparatus for evaporating liquid.—Communications Patents Ltd., and E. C. Stanley.—June 25, 1945. 610,036.

Production of polyvinyl chloride compositions.—Anglo-Iranian Oil Co., Ltd., E. W. M. Fawcett, and E. S. Narracott. June 28, 1945. 610,037.

Manufacture and use of reaction products of organic compounds containing sulphonic acid groups with quaternary ammonium compounds.—J. R. Geigy A.G. July 4, 1944. 610,038.

Preparation of esters of beta-benzyl mercaptovaline, and derivatives and intermediates thereof.—American Cyanamid Co. July 17, 1944. 609,722.

Air temperature conditioning system.—Garrett Corporation. Oct. 11, 1944. 609,823.

Methods of and apparatus for effecting vaporisation at reduced pressure.—Communications Patents, Ltd., and E. C. Stanley. Sept. 19, 1945. 610,047.

Preparation of labile vinyldiacetonalkamine and the production of eucatropine hydrochloride therefrom.—W. R. Warner & Co., Inc. Oct .19, 1944. 610,048.

Method of making dithiophosphoric acid esters of an alkyl-substituted phenol and mineral oils containing these compounds.—F. J. Cleveland. (Socony-Vacuum Oil Co., Inc.) Oct. 24, 1945. 610,056.

Production of magnesium cyanide.—American Cyanamid Co. Nov. 30, 1944. 609,731.

Manufacture of synthetic resins.—E. Hene. Nov. 5, 1945. 609,734.

Agents for colouring emulsions and dispersions, especially those of the oil in water type, and method for the production of such agents.—Grindstedvaerket A/S. June 2, 1942. 609,744.

Method for the transference of liquefied gases.—Solvay & Cie. June 8, 1942. 609,829.

Hydrogen production.—Hercules Powder Co. Feb. 6, 1945. 610,078.

Catalyst preparation.—J. G. Fife. (Shell Development Co.) Jan. 28, 1946. 610,080.

Process for the production of asphaltic bitumens.—N.V. De Bataafsche Petroleum Maatschappij. May 1, 1940. 610,086.

Production of linear polymers containing heterocyclic rings.—S. J. Allen, and J. G. N. Drewitt. Sept. 30, 1942. 610,304.

Method for making polyoxyalkylene glycols.—H. E. Potts. (Carbide & Carbon Chemicals Corporation.) Feb. 8, 1944. 610,505.

Method and apparatus for filtration.—C. L. Peterson, and C. J. Peterson. June 30, 1944. 610,507.

Production of basic polyamides.—S. J. Allen, and J. G. N. Drewitt. July 28, 1944. 610,311.

Manufacture of iron powder, and products produced therefrom.—Soc. d'Electro-Chimie, d'Electro-Metallurgie et des Acieries Electriques d'Ugine. March 1, 1943. 610,514.

Apparatus for classifying and separating solid bodies carried by a liquid current.—Soc. Anon. des Houilleres de Messeix, and J. A. Labouygues. Nov. 3, 1943. 610,516.

Acrylonitrile.—American Cyanamid Co. June 6, 1942. 610,326.

Coating of objects by cathodic disintegration.—W. Edwards & Co. (London), Ltd., and L. A. Holland. Sept. 7, 1945. 610,529.

Progress for the manufacture of agglomerated refractory products.—Soc. Anon des Manufactures des Glaces et Produits Chimiques de St.-Gobain, Chauny & Cirey. July 9, 1941. 610,334.

Process for the removal of impurities of an organic nature from aqueous liquids or liquids miscible with water by means of synthetic resin gel grains.—O. J. Meijer's Dextrinefabrieken, N.V. April 19, 1944. 610,336.

Generation of acetylene or other gas.—Shawinigan Chemicals, Ltd. Dec. 30, 1944. 610,546.

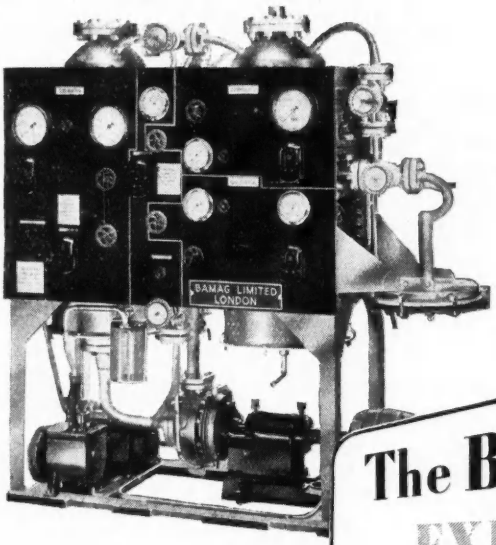
Process for the removal of the oxide or salts of iron from zirconium compounds.—F. W. Berk & Co., Ltd., and F. W. Chambers. Jan. 11, 1946. 610,548.

Process for the manufacture of basic zirconium sulphate.—F. W. Berk & Co., Ltd., and F. W. Chambers. Jan. 11, 1946. 610,549.

Method of extraction of technically valuable products from emulsions, sludges, slurries, pulps, mashes, ground seeds and fruits and solid-water mixtures, by means of solvents.—J. W. McGregor & Sons, Ltd. Jan. 27, 1945. 610,339.

Method and apparatus for the recovery of alcohol from fermentation carbon dioxide.—Dansk Gaerings-Industri A/S. Sept. 11, 1940. 610,341.

Machines for forming pellets or small particles of plastic materials.—F. E. Brown. March 1, 1946. 610,560.



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